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MADRAS JOURNAL

OF

LITERATURE AND SCIENCE.

NO. 7. NEW SERIES.

April—Sept. 1858.

I. *Vocabulary of the Dialect spoken by the* KOTAS *on the* NILAGIRI *Hills by the Rev.* F. METZ.

I am not aware that any thing has been written about the language of the Kotas who occupy the seven villages on the Hills, called Kotagherry, and must have settled on these mountains at the same period or not long after the time, when the Todas, the so called Aborigines of the Hills, chose them as a pasture for their large herds of Buffalos. It is very probable that the Kotas lived among the Todas or in the neighbourhood of them before their immigration to the Hills, and that they supplied the latter with grain and jewels, in return for which they got all the Buffalos which died, at the time when both tribes inhabited some mountains to the North East of the Hills, and that the Kotas followed their acknowledged masters the Todas, on account of the rich harvest of Buffalo carcases by which they were sure to find always a good subsistence.

The dialects of the Todas and Kotas are so near to each other that both parties can converse with each other in their own language, but when the Badagas came up, they found it necessary to acquire the language of the new settlers, because they were superior both in numbers and civilization.

What I said formerly of the Toda language, that their singular pronounciation cannot be learned except by living amongst the people, is also true of the Kota dialect. The language of the former with its pectoral low notes, may very often appear to the unaccustomed ear of an European, as if a number of words were only imitations of the lowing of their Buffalos, and the dialect of the latter with its dental pronounciation appears in many instances as if the barking of their numerous half wild dogs had had an influence in forming it. I find it not difficult to speak about religion in the deep, often solemn tone of the Todas, but it seems to me like mockery to imitate the Kota pronounciation of the same words. Though none of the Hill tribes are very exact in cleanliness, still the name of Kota is used as a name of abuse, in the sense of filthy, by the Badagas and Todas notwithstanding the great dependence the latter acknowledge towards them; they are their scavengers, their musicians, their gold and blacksmiths, their potters, their basket makers, &c. Industry in these several branches makes them thriving and independent, and they can force their masters to many things, which they are very unwilling to perform, by refusing to make ploughs and pots &c. for them. If christianity should take root in the other tribes, so that they would no more condescend to pay honour to the Idols made by the Kotas, it will be a great trial for them. At different occasions the Kotas, who never were very favourably inclined towards our preaching, showed their power very plainly and forced some head men of the other tribes, who were friendly towards the missionaries, to compromise with their own better persuasion. The Kotas honour Siva as the supreme god whom they call Kamataraya and in each of their seven villages there is a temple for him as well as for his wife Parvati. There is a tradition that they emigrated from some mountains situated in the present Mysore, which their ancestors knew by the name of Kollimale, on which account the first village they built on the Hills, goes by the same name. In comparing the Toda vocabulary with the Kota words given

below, philologists will not find it difficult to discover the same root in most of their words, but if they had an opportunity to listen to their village quarrels, they would be surprized to find the same words so very differently pronounced by a Kota, from what they are by the mouth of a Toda, in his lonely Mandu. I have endeavoured to select the most common words corresponding to the same words of the Todas which formerly appeared in this journal.

VOCABULARY.

Abaisance (I make)	ಅಡ್ಡಬುಡ್ಡಪೆ* *aḍḍabuḍḍape.*
Abandon	ವಿಟ್ಟಿರ್ತವೆ *viṭṭirtave.*
Abide	ಯಿತವೆ *itave.*
Abominate	ತಳಿಕಪೆ* *ṭalikape,* or ಜೆಗ್ಗೆಪೆ *jeggepe.*
Abomination	ನಾಚಿಕೆ *náchike.*
Absorb	ನುಂಗಿಟಿಕಪೆ* *nungiṭikape.*
Absurd	ಪೋಕುರಿ *pókuri.*
Abundant	ಅಪರ *apara.*
Accept	ಯೆತ್ತಿಕಪೆ *ettikape.*
Accommodate	ಪೆರೆ ಈಸುಪೆ *pere ísupe.*
Account v.	ಲೆಕ್ಕಯಿಸುಪೆ *lekkaísupe.*
Account n.	ಲೆಕ್ಕನ *lekkana.*
Accompany (him)	ಅವನೋಡ ಹೋಗಪೆ *avanóḍa hógape.*

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* I was not quite sure whether I should not substitute ಪಿ instead of ಪೆ because the Kota pronounciation is so very indistinct and in many verbs different people pronounce it something like ವೆ.

Accurate	ಸೆರೆ *sere.*
Accurse	ಶಾಪೆಯಿಟ್ಟುಕಪೆ *sápe iṭṭukape.*
Accuse	ಪಿರ್ಯಾದಿಪಡುದಕಪೆ *piryádi paḍudakape.*
Aches, (it)	ಏರ್ಸೊ *érso.*
Acquire	ಕಲ್ಲಕಪೆ *kallakape.*
Adore	ಕೊಂಬಿಟ್ಟುಕಪೆ *kombiṭṭukape.*
Advice	ಬುದ್ದಿ *buddi.*
Afar	ದೂರ *dúra.*
Affection	ಗವ *gava.*
Afraid (I am)	ಅಂಜಿಪೆ *anjipe.*
Afternoon	ಯೇರುಬುಡುವಜಾಮ *yérubuḍuva jáma,*

(time to loose the oxen from the plough)

Again	ಕಾಕೋನೆ *kákóne.*
Age	ಪೆರಯೆ *peraye.*
Ago	ಪೋನಾಱೆ *pónáṟe.*
Agree	ವೊಬ್ಬೊಪೆ *vobbope.*

Air ಕಾತೆ *káte,* others pronounce it ಕಾಟೆ *káṭe,* which I think is more correct.

Alas	ಅವವಾ *avavá.*
Alms	ದರ್ಮೆ *darme.*
Alike	ಸಮ್ಮಾಯಿಪೆ *sammáyipe.*
All	ಯೆಲ್ಲಮೆ *yellame.*
Anecdote	ಪಾಟೆ *páṭe.*

Alone ವೊಜ್ಜಾಳೆ *vojjáḷe.*

Amputate ಏರಿಕಪೆ *érikape.*

Anger ಕೋಪೆ *kópe,* ಕೋಪಮೆ *kópame.*

Angry (I am) ಯೆನಗ ಕೋಪೆಬದ್ದದೆ *yenaga kópe baddade,*
(to me anger has come.)

Anna ಪಣ್ಣಮೆ *paṇṇame.*

Ancestor ಪೇರೈಯನೆ *péraiyane.*

Another ಪಿನ್ನೊದ್ದ *pinnodda.*

Ant ಯಿರ್ಬೆ *yirbe,* White ant ಗೆಸಳೆ *gesale.*

B.

Baby ಮಗ್ಗೆ *magge.*

Back (n) ಪಿತ್ತಳೆ *pittale.*

Backbiting ಪಿತ್ತಳಾಟ *pittaláṭa.*

Backward ಪಿಬ್ಬಾರೆ *pibbáre.*

Badge ಗುರ್ತೆ *gurte.*

Bag ಜೀರುಮೆ *jírume.*

Bail (I am) ಪೆಣಾಗಪೆ *peṇágape.*

Bald ತರ್ಮಂಡೆ *tarmande.*

Bamboo ವೆದೆರೆ *vedere.*

Bat ಕನೆಪತ್ತೆ *kanepatte.*

Bathe ನೀರಕಾರ್ತುಕಪೆ *nírakártukape.*

Battle ಪೋರಾಸ *pórása,* ಪೋರಾಟ *póráṭa.*

Bark of a tree ಪೂಳೆ *púḷe.*

Bark (verb)	ಪಾರ್ಕಪೆ *párkape.*
Barley	ಗಾಜ್ಜೆ *gájje.*
Barren	ವೈದೆ *vaide.*
Basket	ಗಿಕ್ಕೆ *gikke.*
Beat	ಪುಯಿಕಪೆ *puyikape.*
Be	ವೊಳೆ *voḷe.*
Bean	ಅವುರೆ *avure.*
Bear (noun)	ಕರಡೆ *karaḍe.*
Bear (verb)	ಪೊರೇಕಪೆ *porékape.*
Beard	ಪೀದೆ *píde,* ಮೀರ *míra.*
Beast	ಮಿರಿಗ *miriga.*
Bee	ತೇನಗುನಿ *ténaguni.*
Bee's wax	ಮೆಕ್ಕೆ *mekke.*
Bedstead	ಕಟ್ಟಿಲೆ *kaṭṭile.*
Before	ಮುಂದಾಲ್ *mundál.*
Beg	ವೇಸುಪೆ *vésupe.*
Beggar	ಪರ್ಕನೆ *parkane.*
Behead	ಕ್ವಟಲೆ *kwatale,* ಕುಯಿಕಪೆ *kuyikape.*
Behind	ಪಿಬ್ಬಾಲೆ *pibbále.*
Believe	ನೆಂಬದೊಳೆ *nembadoḷe.*
Below	ಕೈಯೀಯೆ *kyíye.*
Bellow	ಪಿಟ್ಟಿಗೆ *piṭṭige.*
Between	ನರ್ತಲೆ *nartale.*

Be it so	ಆಗೋತೆ *ágóte.*
Bell	ಮಂಣೆ *maṇṇe.*
Bend	ವಕ್ಕಿಸಿಪೆ *vakkisipe.*
Beware of	ವೊಳ್ಳಮೆನೋಸೆಉಳೋ *voḷḷame nóse uḷó.*
Big	ದೊಡ್ಡುದೆ *doḍḍude.*
Bile	ಪಿತ್ತೆ *pitte.*
Bind	ಕಟ್ಟುಕಪೆ *kaṭṭukape.*
Bird	ಪೆತೆ *pete.*
Bird cage	ಪೆತೆಗೂಡೆ *petegúḍe.*
Bite	ಕಡಿಕಪೆ *kaḍikape.*
Bison	ದೊಡ್ಡೆಂಮೆ *doḍḍemme.*
Bitter	ಕಜ್ಜೆ *kajje.*
Black	ಕರೆ *kare.*
Blackberry	ಮುಳ್ಳಪಂಣೆ *muḷḷapaṇṇe.*
Blind	ಕುರುಡನೆ *kuruḍane.*
Bliss	ಸುಕ್ಕಮೆ *sukkame.*
Blood	ನೆತ್ತುರು *netturu.*
Board	ಪಲಗೆ *palage.*
Bog, swamp	ಏಕೆ *éke.*
Boat	ಅರಿಗಿಲೆ *arigile.*
Born	ಪೆರ್ಕಪೆ *perkape.*
Boil (n)	ಪುಂಣೆ *puṇṇe.*
Boils it	ಪೊಯಿಕೊ *poyiko.*

Bone	ಎಲ್ಲವೆ *ellave.*
Bottle	ಪೆಟ್ಟಿಗೆ *peṭṭige.*
Boundary	ಕಟ್ಟೆ *katte.*
Bow (a)	ಬಿಲ್ಲೆ *bille.*
Bowels	ಕೊಡನೆ *koḍane.*
Box	ಪೆಟ್ಟಿಗೆ *peṭṭige.*
Boy	ಮಗ್ಗೆ *magge,* ಮಾತಿ *máti.*
Breast	ಯೆದ್ದೆ *yedde,* woman's breast ಮೆಳ್ಳೆ *meḷḷe.*
Bracelet	ವಲ್ಲೆ *valle.*
Bramble	ತಪ್ಪೆ *tappe.*
Branch of a tree	ಜಿಲೆ *jile.*
Brass	ಕಜ್ಜೆ *kajje.*
Break	ಮುರ್ಸಿಕಪೆ *mursikape.*
Breath	ಜೀವಿಲು *jívilu.*
Breathlessness	ಉಪ್ಪಸೆ *uppase.*
Breed	ಪೆರ್ಕಿಸಿಪೆ *perkisipe.*
Bribe	ನಂಜುಮೆ *nanjume.*
Bring	ತಕಪೆ *takape.*
Brook	ಪೇಯೆ *péye.*
Brother (elder)	ಅಣ್ಣೆ *aṇṇe,* (younger) ಕೆರಾಳೆ *keráḷe.*
Brother-in-law	ಪೆರುದಪ್ಪನೆ *perudappane.*
Brow	ಕಂಬುವೆ *kambuve.*
Buffalo	ಯಿಂಮೆ *yimme.*

Build	ಕಟ್ಟುಕಪೆ *kaṭṭukape*, ಯೆತ್ತುಕಪೆ *yettukape.*
Burden	ಪೊರ್ರೆ *porre.*
Burn	ಜುಟ್ಟುಕಪೆ *juṭṭukape.*
Business	ಕೇಕೆ *kéke.*
Butter	ವೆಂಣೆ *veṇṇe.*
Buttermilk	ಮಂಜೆ *manje.*
Butterfly	ಕಪ್ಪುಟೆ *kappuṭe.*

C.

Cage	ಗೂಡೆ *gúḍe.*
Calf	ಕಡೆ *kade.*
Call	ಆರ್ಕಪೆ *árkape.*
Calumniator	ಜಾಡಿಕಾರನೆ *jáḍikárane.*
Camel	ವೊಟ್ಟೆ *voṭṭe.*
Carriage wheel	ತಿರ್ಗನೆ *tirgane.*
Cast away	ತೈಲಿಕಪೆ *tailikape.*
Castle	ಕೋಟೆ *kóṭe.*
Cat	ಪೀಸೆ *píse.*
Catch	ಪತ್ತಕಪೆ* *pattakape.*
Centre	ನರ್ತಲೆ *nartale.*
Chaff	ಪೊಟ್ಟೆ *poṭṭe.*
Chain	ತಕ್ಕಾಲೆ *takkále.*

* It is very likely that the name of Ootacamund (Toda ಪತಖಮಡ್ಡು) "Patakhamaddu" is derived from this root and would literally mean, "Mand of catching," because it was a funeral Mand of the Todas.

Chalk	ಸುನಮೆ *suname.*
Chat	ಮಾನಿಕಪೆ *mánikape.*
Cheap	ಅಗ್ಗುಮೆ *aggume.*
Cheat	ಮೋಸಮಾಡ್ಕಪೆ *mósamáḍkape.*
Cheek	ತಾಡೆ *táḍe.*
Child	ಮಗ್ಗೆ *magge.*
Chin	ಪೀಡೆ *píḍe.*
Claw	ಕೊಲಕೆ *kolake.*
Clay	ಮಂಣೆ *manṇe.*
Clean	ಪಾಸನೆ *pásane.*
Cloud	ಕೀಡೆ *kíḍe,* ಗೀಡೆ *gíḍe.*
Climb	ಪೊರ್ತಪೆ *portape.*
Club	ಕುಂಡೆ *kunḍe.*
Coal	ಕರಿ *kari.*
Cobweb	ಜೆಲದಿಗೂಡೆ *jeladigúḍe.*
Cocoanut	ತೆಂಗಿನಕಾಯಿ *tenginakáyi.*
Cold (feverish)	ನಾನ್ಮರಲೆ *nánmarale.*
Cold from cold weather	ಕರ್ರವೆ *karrave.*
Colour	ಸಾಯವೆ *sáyave.*
Come	ವಾಕ್ಕೆನ *vákkena.*
Command	ಅಪ್ಪಣೆ *appaṇe.*
Conjurer	ಪಿಲಿಕಾರನೆ *pilikárane.*
Companion	ಮಾಳೆ *máḷe.*

Comprehend	ಅರ್ಥಿಪೆ *arthipe.*
Consent	ಆಕಪೆ *ákape.*
Corn, grain	ವತ್ತಮೆ *vattame.*
Corner	ಮೂಲಮೆ *múlame.*
Corpulent	ಬಹು ಪೆಟ್ಟಿಗೆ *bahupeṭṭige.*
Cotton	ಪಂಡೆ *panḍe.*
Cough	ಕಕ್ಕಿಲು *kakkilu.*
Count	ಎಕ್ಕನ ಕೇಕೆನ *yekkana kékena.*
Countenance	ಮೋಂಡೆ *mónḍe.*
Country	ನಾಡೆ *náḍe.*
Courage	ಧೈರ್ಯವೆ *dairyave.*
Cowries	ಕೌವಡಿ *kouvaḍi.*
Cover, hide	ಮುಜ್ಜಿಪೆ *mujjipe.*
Cow	ಆವೆ *áve.*
Crab	ನೈಲಿನೆ *nailine.*
Cream	ಮಂಜೆ ವೆಣ್ಣೆ *manje veṇṇe.*
Cripple	ಕುಟ್ಟನೆ *kuṭṭane.*
Crooked	ಕೋಂಕೆ *kónke.*
Crow	ಕಾಕೆ *káke.*
Cry	ಐಕಪೆ *aikape.*
Cultivate, plough	ಉಕಪೆ *ukape.*
Curse	ಶಾಪೆ ಯಿಟ್ಟುಕಪೆ *sápe yiṭṭukape.*
Cut	ಏರ್ಕಪೆ *érkape.*

D.

Dance (verb)	ಆಡಕಪೆ *áḍakape.*
Dark	ಕತ್ತಲೆ *kattale.*
Daughter	ಪೆಂಮಗ್ಗೆ *pemmagge.*
Daughter in law	ಸೊಸೆ *sose.*
Day	ನಾಳೆ *náḷe.*
To day	ಯಿಂದೆ *yinde.*
Day after to morrow	ನಂಗೆಗೆ *nangege.*
Deaf	ಕಿವಿಡನೆ *kiviḍane.*
Death	ತಾವೆ *táve.*
Debt	ಸಾಲಮೆ *sálame.*
Deceive	ಮೋಸಮಾಡಕಪೆ *mósamáḍakape.*
Deceiver	ಮೋಸಕಾರನೆ *mósakárane.*
Deep	ಉದ್ದುಮೆ *uddume.*
Demon	ಬೂತುಮೆ *bútume.*
Deny	ಯಿಲ್ಲಾದುಪೆ *yilládupe.*
Depart	ಪೋಗಪೆ *pógape,* ಹೋಗಪೆ *hógape.*
Deride	ನಲ್ಲಿಸಿಕಪೆ *nallisikape.*
Desert	ವಿಟ್ಟಿರ್ಕವೆ *viṭṭirkave.*
Descend	ಎರ್ಕವೆ *erkave.*
Desire	ಆವೆಲು *ávelu.*
Diarrhœa	ಪೆಟ್ಟಿಗೆ ಹೋಯಿತೊ *peṭṭige hóyito.*
Difference	ಕಡಲುಮೆ *kaḍalume.*

Dig	ಅಗ್ಗಪೆ *aggape.*
Diminish	ಜೆಟ್ಟಿಗಮಾಡಕಪೆ *jeṭṭigamáḍakape.*
Die	ತೌಕವೆ *taukave* or ತಾಕವೆ *tákave.*
Dirt	ಮಾಸೆ *máse.*
Dirty (I make)	ಮಾಸೆ ಕೇಕಪೆ *másekékape.*
Dishonour	ಮಾನಕೆಟ್ಟಿಸಿರ್ಕಪೆ *mánakeṭṭisirkape.*
Disappear	ಕಡ್ಡಾಧ್ಹೋಗಪೆ *kaḍḍádhógape.*
Dismiss	ಕೈತಿರ್ಕಪೆ *kaitirkape.*
Dispute	ಹೊಯಿಕಿರ್ಕಿಪೆ *hoyikirkipe.*
Ditch	ಗುಯ್ಯಿಯೆ *guyyiye.*
Divide	ಪಾಲ್ಕೇಕಪೆ *pálkékape.*
Dog	ನಾಯೆ *náye.*
Door	ತಾಯೆ *táye.*
Drive	ಯೇಥಿರ್ಕಪೆ *yéthirkape.*
Drink	ಉಣಕಪೆ *uṇakape.*
Drown	ಮ್ಯೂಗಿಹೋಗಪೆ *múyigi hógape.*
Drop	ಸೊಟ್ಟೆ *soṭṭe.*
Drum	ಪರ್ರ *parra.*
Drum (verb)	ಪರ್ರಹುಯಿಕಪೆ *parrahuyikape.*
Dry	ವೊನ್ನಕಪೆ *vonnakape.*
Dull	ಪೊಟ್ಟನೆ *poṭṭane.*
Dung	ಕೋಪಾರುನೆ *kópárune,* ಪೀಯೆ *píye.*
Dwarf	ಮೊಂಣಿನ *moṇṇina.*

E.

Eagle, vulture	ನಾಯೆಪೊಧಕಾರನ *náyepodhakárana.*
Ear	ಕೇವಿ *kévi.*
Earth, ground	ಬುಯಿಮಿ *buyimi.*
Echo	ವೋಜೆ *vóje.*
Eat	ತಿನಿಕಪೆ *tinikape.*
Eclipse	ಗಿರಣ *giraṇa.*
Egg	ಮೊಟ್ಟೆ *moṭṭe.*
Elegant	ಪಾಸನೆ *pásane.*
Eight	ಯೆಟ್ಟೆ *yeṭṭe.*
Eighteen	ಪವೆನೆಟ್ಟೆ *paveneṭṭe.*
Eighty	ಯೆಂಬತ್ತು *yembattu.*
Enemy	ಹಗ್ಗೆಗಾರನೆ *haggegárane.*
Enough	ಸಾಕೊ *sáko.*
Elbow	ಮೊಗ್ಗೈಯೆ *moggaiye.*
Elephant	ಆನೆ *áne.*
Elk	ಮಾವೆ *máve.*
Embrace	ತ್ಯಬ್ಬಿಸಿಪೆ *tyabbisipe.*
Empire	ಸೀಮೆ *síme.*
Equal	ಸೆರೆ *sere.*
Ever	ಯೆಂದುಗು *yendugu.*
Excrement	ಪೀಯೆ *píye.*
Expel	ಕೈತಿರ್ಕಪೆ *kaitirkape.*

Expenditure	ಸಂತೆಕು *santeku.*
Eye	ಕಂಣೆ *kaṇṇe.*
Enchanter	ಉಡಿಕಾರನೆ *uḍikárane.*
End (verb)	ಕೆಸೆತ್ಹೋಕಪೆ *kesethókape.*
Enter	ವೊಳ್ಪೋಗಪೆ *voḷpógape.*
Envy	ಹೊಟ್ಟೆಕಿಚ್ಚೆ *hoṭṭekichche.*
Error	ತಪ್ಪೆ *tappe.*
Evening	ಕತ್ತಲೆ *kattale.*
Every	ಯೆಲ್ಲಾಮೆ *yelláme.*

F.

Fall	ವಿಡುಡುಹೋಗಪೆ *viduduhógape.*
Face	ಮೋಂಡೆ *mónḍe.*
Falsehood	ಕಿಂಡೆ *kinde.*
Family	ಕುಟುಂಬೆ *kuṭumbe.*
Faith	ನಂಬಿಕೆ *nambike.*
Fat	ವಾಳುನೆ *válune.*
Far	ದೂರ *dúra,* ದೂರುಮೆ *dúrume.*
Farmer	ವೊಕ್ಕಲಿಗನೆ *vokkaligane.*
Funeral	ತಾವೆ *táve.*
Fur	ತೋಳೆ *tóḷe.*
Fort	ಊಸೆ *úse.*

G.

Gain	ಲಾಬೆ *lábe.*

Gall	పిత్తె *pitte.*
Gallows	తూకమరవె *túkamarave.*
Garlic	ఉళి *uḷi.*
Gather	కూటకపె *kúṭakape.*
Gate	బాలె *bále.*
Ghee	నైయె *naiye.*
Ghost	బూతె *búte.*
Giant	అర్కాసె *arkáse.*
Girl	పెంమగ్గె *pemmagge.*
Give	కొడుకపె *koḍukape,* తకపె *takape.*
Go	హోగపె *hógape.*
Gloworm	మీనె *míne.*
Goat	ఆడె *áḍe.*
God	దేవరె *dévare.*
Gold	పొంణె *poṇṇe*
Goldsmith	వెళిగెసన *veḷigesana.*
Good	వొళ్లెదె *voḷḷede.*
Gooseberry	తౌటెపంణె *tauṭepaṇṇe.*
Grain	వత్తమె *vattame.*
Grandfather	పెరాళె *peráḷe.*
Grandmother	పెరవ్వె *peravve.*
Grandson	మంమగ్గె *mammagge.*
Grass	పుల్లె *pulle.*

Grasshopper	ಮಿಟಿಲೆ *miṭile.*
Gray	ನರೆ *nare.*
Great	ಡೊಡ್ಡೆ *doḍḍe.*
Green	ಪಚೆ *pache.*
Grief	ದುಕ್ಕ *dukka.*
Grind	ಬೀಸುಡ್ಡವಕೆನ *bísuḍḍavakena.*
Grinding stone	ಕಲ್ಲೋಲೆ *kallóle.*
Groan	ನರಗಿಯುಡ್ಡೊಳೆ *naragiyuḍḍoḷe.*
Ground	ನೆಲ್ಲುಮೆ *nellume.*

H.

Hail	ಅರಗಲ್ಲಮ್ಯಾಯೆ *aragallamyáye.*
Hair	ಮೀರೆ *míre.*
Half	ಅಡುಮೆ *aḍume.*
Hand	ಕೈಯೆ *kaiye.*
Hard	ಕಲ್ಲಕಜೆಕೊ *kallakajeko.*
Hair	ಮೊಳಮೆ *moḷame.*
Harlot	ಸೂಳೆಮಗ್ಗೆ *súḷemagge.*
Hate	ಪಗ್ಗೆವಜಯಿಟ್ಟುಕಪೆ *paggevajayiṭṭukape.*
Hatred	ಪಗ್ಗೆ *pagge.*
Halt	ಕುಟ್ಠಾರುಡ್ಡವಕಪೆ *kuṭháruḍḍavakape.*
Hammer	ತಪುಟಿಗೆ *taputige.*
Handle	ಕಾವೆ *káve.*
Hang (oneself)	ನೇಂದತೌಕಪೆ *néndataukape.*

Hang (another)	ತೂಕಪೆ *túkape.*
Hatchet	ಯಿರ್ವಾಲೆ *yirvále.*
Haughty	ಮೇಟೆ *méṭe.*
Hawknose	ಪಥುಮೂಕೆ *pathumúke.*
Head	ಮಂಡೆ *mande.*
Hearken	ಕೇಳಕಪೆ *kéḷakape.*
Heart	ಗೆಂಡೆ *genḍe.*
Heat	ವೀಳೆ *víḷe.*
He	ಅವನೆ *avane.*
Heap	ಗೂಜಲೆ *gújale.*
Heavy	ವಾರಮೆ *várame.*
Here	ಯಿಯಯಿ *yiyayi* (ಯಿಲ್ಲೆ) *yille.*
Hew	ಏರ್ಕಪೆ *érkape.*
Herb	ಸೊಪ್ಪೆ *soppe.*
Hiccup	ಹಿಕ್ಕೋಟೆ *hikkoṭe.*
Hide (reflex)	ವೊಳಸಕವೆ *voḷasakave.*
Hide	ಪೂರ್ಕಪೆ *púrkape.*
Hill	ದಿಟ್ಟೆ *diṭṭe.*
Hog	ಪಜ್ಜೆ *pajje.*
Hoof	ಕೊಲಕೆ *kolake.*
Hook	ಕೊಂಕೆ *konke.*
Hold	ಪದ್ಧಕಪೆ *paddhakape.*
Honey	ತೇನೆ *téne.*

Honour	ಮಾನೆ *máne.*
Horn	ಕೊಂಬೆ *kombe.*
Horse	ಕುದುರೆ *kudure.*
Horsegram	ಪುರುಳಿ *puruli.*
Hot	ವೇದ್ದ *védda.*
House	ಪೈಯೆ *paiye.*
How	ಯೇನೇನಮೆ *yénéname.*
Howl	ಪಾರ್ಕಪೆ *párkape.*
Hungry	ಪೆಟ್ಟಿಹೋಸೆ *peṭṭihóse.*
Hundred	ನೂರೆ *núre.*
Hunt	ವೇಟಹೋಗಪೆ *véṭahógape.*
Husband	ಆಳೆ *áḷe.*
Humbug	ಪಿತ್ತಲಾಟೆ *pittaláṭe.*

I.

I	ಆನೆ *áne.*
Ibex	ಕಲ್ಲಾಡೆ *kalláḍe.*
Ice	ಪೈನು *painu.*
Idle	ಮೋಡ *móḍa,* ಸೋಮಾರೆ *sómáre.*
Ichneumon	ಕೀರಿ *kíri.*
If	ಮೇಲೆ *méle.*
Illness	ನೋವೆ *nóve.*
Impede	ಅಡಿಗಿಕಪೆ *aḍigikape.*
Impotent	ವರದನೆ *varadane.*

Improper	ಸೆರೆಯಿಲ್ಲ *sereyilla.*
Improve	ವೊಳ್ಳ ಮೊಳೆ *voḷḷamoḷe.*
Impure	ಮಾಸೆಕೊ *máseko.*
Incense	ದೂಪೆ *dúpe,*
Increase	ದೊಡ್ಡ ಲಾಕಪೆ *doḍḍalákape.*
Indecent	ಮಾನಕೆಟ್ಟವನ *mánakeṭṭavana.*
Inflammation	ಜೆಗ್ಗೆ *jegge.*
Infant, female	ಪೆಂಮಗ್ಗೆ *pemmagge.*
Infant, male	ಗಂಡೆಮಗ್ಗೆ *gandemagge.*
Informer	ಮೊರೆಕಾರನೆ *morekárane.*
Insufficient	ಯೆಡ *yeḍa.*
Ink	ಕರಿ *kari.*
Insensible	ನೆನವಿಲ್ಲ *nenavilla.*
Insane	ಬೂತವಜಿಕೊ *bútavajiko.*
Interest	ವಜ್ಜೆ *vajje.*
Ire	ಕೋಪಮೆ *kópame.*
Iron	ಯಿಬ್ಬೆ *yibbe.*
Itch	ತೂರಿವೆ *túrive.*
Iris (of the eye)	ಕಂಣೆಮಗ್ಗೆ *kaṇṇemagge.*

J.

Jackal	ನರಿ *nari.*
Jackfruit	ಪಳ ಪಂಣೆಮೆ *paḷapaṇṇeme.*
Jest	ನಲ್ಲಿಕಪೆ *nallikape.*

Join	ಕೂಟಕಪೆ *kúṭakape.*
Journey	ಪಯಣ *payaṇa.*
Joy	ಸಂತೋಸ *santósa.*
Jug	ಕೊಡಮೆ *koḍame.*
Juice	ನೀರೆ *níre.*
Jump	ಪಾರ್ಕಪೆ *párkape.*
Justice	ನಾಯಮೆ *náyame.*

K.

Keep	ಕಾಪಾಡಕಪೆ *kápáḍakape.*
Key	ಬೀಗದಕೈ *bígadakai.*
Kick	ವೊಕ್ಕಪೆ *vokkape.*
Kill	ತಾವೆರ್ಷಯಿಕಪೆ *tauvershayikape.*
Kind (noun)	ಮಾದರೆ *mádare.*
Kindness	ದಯೆ *daye.*
Kindred	ನೆಟ್ಟನೆ *neṭṭane.*
King	ದೊರೆ *dore.*
Kiss	ಮೂಂಗೆಹಾಕಿಪೆ *múngehákipe.*
Knee	ಮೊಗ್ಗಾಲೆ *moggále.*
Kneel	ಮೊಗ್ಗಾಲೂರ್ಕವೆ *moggálúrkave.*
Knock	ಕೊಡ್ಗಲ್ ಕೋಟುಕಪೆ *koḍgul koṭukape.*
Know	ಅರ್ಸಿಪೆ *arsipe.*
Knife	ಜೂರಿ *júri.*

L.

Ladder	ಯೇಣಿಲು *yénilu.*
Lake	ಕೇರೆ *kére.*
Language	ಬಾಸೆ *báse.*
Late	ತಡೆವಾಯಿ *taḍeváyi.*
Lead	ತೀಸಲು *tísalu.*
Leap	ಪಾರ್ಕಪೆ *párkape.*
Leaf	ಯೆಲೆ *yele.*
Leather	ತೋಳೆ *tóḷe.*
Leave	ಬಿಟ್ಟುಡ್ಡಹೋಗಪೆ *biṭṭuḍḍahógape.*
Leech	ಯಿಪುವೆ *yipuve.*
Left	ಯೆಡ್ಡೆ *yeḍḍe.*
Leg	ಕಾಲೆ *kále.*
Lemon	ಎಲ್ಮಿಚ್ಚೆ *yelmichche.*
Leopard	ಕಿರ್ಬನೆ *kirbane.*
Leprosy	ದೊಡ್ಡರೋಗ *doḍḍaróga.*
Liar	ಸುಳ್ಳುಗಾರನೆ *suḷḷugárane.*
Lie down	ವೊರ್ಕಪೆ *vorkape.*
Life	ಜೀವೆ *jíve.*
Lift up	ತೂಕಪೆ *túkape.*
Lime	ಸುನುಮೆ *sunume.*
Limit	ಕಟ್ಟೆ *katte.*
Lip	ತೂಸ *túsa.*

Listen	ವೋರಾಟಿಕೆನ *vóráṭikena.*
Little	ಕುಂನ *kunna.*
Lizard	ವೋಣ *vóṇa.*
Load	ಪೆರ್ರೆ *perre.*
Lock	ಬೀಗೆ *bíge.*
Long	ಉದ್ದುಮೆ *uddume.*
Look	ನೋಡಕಪೆ *nóḍakape.*
Loosen	ಬಿಡುಕಪೆ *biḍukape.*
Loud	ವೊಳ್ಳಾಂ *voḷḷám.*
Love (I)	ಗವವಜುಪೆ *gavavajupe.*
Lust	ಆವೆಲು *ávelu.*
Labour, (I)	ಗೀತವೆ *gítave.*

M.

Mad	ಬೂತಪೆಜವನ *bútapejavana.*
Make	ಕೇಕಪೆ *kékape.*
Malediction	ಶಾಪೆ *sápe.*
Malice (I have)	ಹೊಟ್ಟೆಕಿಚ್ಚುಕೇಕಪೆ *hoṭṭekichchukékape.*
Man	ಮನಿಸನ *manisana,* ಆಳೆ *áḷe.*
Mango	ಮಾವ್ಹಣ್ಣೆ *mávhaṇṇe.*
Many	ಅಪರಮೆ *aparame.*
Marry	ಪೇಟುಕೊಳಕಪೆ *péṭukoḷakape.*
Marsh, swamp	ಏಕೆ *éke.*
Mat	ಮಂದರಿ *mandari.*

Matter	ಗೀವೆ *gíve.*
Meat	ಬೋತೆ *bóte.*
Medicine	ಮದ್ದೆ *madde.*
Meet	ಆಳಾರೆವದ್ದಕಾಡ್ಕಪೆ *áḷárevaddakádkape.*
Melt	ಕರ್ಗಸಕಪೆ *kargasakape.*
Milk	ಪಾಲೆ *pále.*
Milk (verb)	ಕರ್ರಕಪೆ *karrakape.*
Miscarry	ಮಗ್ಗೆವೀತಕೊ *maggevítako.*
Mist	ಮಂಜೆ *manje.*
Mind	ಮನಸೆ *manase.*
Mind (verb)	ಉನಿಸಪೆ *unisape.*
Miser	ಕರಿಗಾರನೆ *karigárane.*
Mock	ಕೊಂಸಕಪೆ *komsakape.*
Mocking	ಗೇಲಿ *géli*
Money	ಪಣಂ *paṇam.*
Moment	ಜೆನನ್ಹೊತ್ತಿಗೆ *jenanhottige.*
Monkey	ಕೋರ *kóra.*
Moon	ತಿಗ್ಗಲೆ *tiggale.*
Month	ಪೆರ್ರೆ *perre.*
Morning	ವೆಳತಲೆ *veḷatale.*
Morrow (to)	ನಾಳಕೆ *náḷake.*
Mother	ಅವ್ವೆ *avve.*
Motherless	ತವರಿ *tavari.*

Mourn — మండెకూటిఇత్తై కపె *mandekúṭiai-kape.* (Literally I join the head to another and weep.)

Mouse — ఏజె *éje.*

Mouth — వాయె *váye.*

Muscle — నెర్బె *nerbe.*

Mount, ascend — పత్తకపె *pattakape.*

Mountain — బెట్టుమె *beṭṭume.*

Must — వేటు *vétu*, must not వేడె *véḍe.*

Mute — పేమె *péme.*

N.

Nail — ఊరె *úre.*

Naked — వెరుయిపి *veruyipi.*

Name — పేరె *pére.*

Narrative — పాఠె *paṭhe.*

Nation — కొళ్ళమె *koḷḷame.*

Naught — యేనుమిల్ల *yénumilla.*

Navel — బుక్కవె *bukkave.*

Near — వొత్తలె *vottale.*

Neat — పాపనె *pápane.*

Neck — కర్తలె *kartale.*

Needle — తూసె *túse.*

Neighbour — గోడవ్వైయె *góḍavaiye.*

Nest — గూడె *gúḍe*

Never	ಯೇನಾಳುಕಿಲ್ಲ *yénáḷukilla.*
New	ಪುಧು *pudhu.*
News	ಸುದ್ದೆ *sudde.*
Nick name	ಪೊರ್ರಪೇರ *porrapéra.*
Night	ಕತ್ತಲೆ *kattale.*
Nine	ವೊರಬಡೆ *vorabade.*
Nineteen	ಹಡೊಂಬತ್ತು *hadombattu.*
Ninety	ತೊಂಬತ್ತೆ *tombatte.*
Noise	ಸದ್ದುಮೆ *saddume.*
Noon	ಮದೈನೆ *madaine,*
North	ವಡಗೆ *vaḍage.*
Nose	ಮೂಕೆ *múke.*
Nostrils	ಮೂಕಸೂಂತೆ *múkasúnte.*
No	ಯಿಲ್ಲ *yilla.*
Nothing	ಯೇನಿಲ್ಲಮೆ *yénillame.*
Nourish	ಸಾಕಪೆ *sákape.*
Now	ಯೀನೆ *yíne.*

O.

Oath (I make)	ಸತ್ಯಕೇಕಪೆ *satyakékape.*
Ocean	ಸೌಂದುರು *saunduru.*
Oil	ಯೆಂಣೆ *yeṇṇe.*
Old	ಪೈರ *paira.*
Omen	ಸೌಮೆ *saume,* ಜೌಮೆ *jaume.*

One	ವೊದ್ದೆ *vodde.*
Onion	ಯೀರುಳಿ *yíruḷi.*
Open	ತೆರ್ರಕಪೆ *terrakape.*
Once	ವೊರುಟ್ಟೆ *voruṭṭe.*
Orient	ಮೂಡೆ *múḍe.*
Order to	ಯೇವಲುಯಿಟ್ಟಪೆ *yévalu yiṭṭape.*
Other	ಯಿಂನೊಂದೆ *yinnonde.*
Outside	ಪೊರ್ರಂಜೆ *porranje.*
Over	ಮೇಕೆ *méke.*
Owl	ಗುಂಮನೆ *gummane.*
Ox	ಯೆತ್ತೆ *yette.*

P.

Pain	ಉರ್ಸು *ursu.*
Palace	ಅರಮನೆ *aramane.*
Palate	ಕಿರ್ರನಲಗೆ *kirranalage.*
Paper	ಕಾಗಜೆ *kágaje.*
Paper	ನಿಂಗಲ್ಪಂನಂ *ningalpamnam.*
Part	ಪಾಲುಮೆ *pálume.*
Passion	ಕೋಪಮೆ *kópame.*
Path	ಆಳಾರೆ *áḷare.*
Pawn	ಅಡವೈಯೆ *aḍavaiye.*
Peaceful	ಉಳಿಸ್ತನ *uḷistana.*
Peacock	ಮೀಳೆ *míḷe.*

Pearl	ಮುತ್ತೆ *mutte.*
Pen	ಪೆಕೆ *peke.*
Penis	ಬೀಡೆ *bíḍe.*
Pepper	ಮೊಳಗು *moḷagu.*
Perspiration	ಉರೆ *ure.*
Perish	ಕೆಟ್ಟೋಗಪೆ *keṭṭógape.*
Piece	ತುಂಡುಮೆ *tunḍume.*
Pig	ಪಜ್ಜೆ *pajje.*
Pilfer	ಕಳ್ಳಕಪೆ *kaḷḷakape.*
Pinch (to)	ನಿಲ್ಲಕಪೆ *nillakape.*
Pipe	ಬುಗುರಿ *buguri.*
Piss	ಮೊಳಟ್ಟುಕಪೆ *moḷaṭṭukape.*
Pit	ಕುಯ್ಯೆ *kuyye.*
Place	ಯೆಡಮೆ *yeḍame.*
Plantain	ಬಾಯ್ಯೆಹಂಣೆ *báyehaṇṇe.*
Play	ಆಟ *áṭa.*
Play to	ಆಟಕಪೆ *áṭakape.*
Plenty	ಅಪರಂ *aparam.*
Pledge (I)	ಪೆಂಣಾಗಪೆ *peṇṇágape.*
Plough	ನೇಲೆಗೆ *nélege.*
Plough (verb)	ಉವಕ್ಕವೆ *uvakkave.*
Pocket	ಕೊಂಡಿಲೆ *kónḍile.*
Point out	ಕಾಟ್ಕಪೆ *katkape.*

Poison	ನಂಜು *nanju.*
Pond	ಕೇರೆ *kére.*
Poor	ವಡವನೆ *vaḍavane.*
Potter	ಕೊಂಬಾರನ್ *kombáren.*
Porcupine	ಪೀಪಜ್ಜೆ *pípajje.*
Pour	ಅಟ್ಟುಕಪೆ *aṭṭukape.*
Portion	ಪಾಲಮೆ *pálame.*
Post to	ನಿಲ್ಲಕಿಸಿಕಪೆ *nillakisikape.*
Prepare	ವೊದ್ದಗುರ್ಕಪೆ *voddagurkape.*
Pride	ಮೇಟೆ *méṭe.*
Pray	ಪರ್ಧಕಪೆ *pardhakape.*
Property	ಆದಾರ *ádára.*
Prostrate	ಅಡಮಿಟ್ಕೆನ್ *aḍamitken.*
Proud	ಮೇಟೆಗಾರ *méṭegára.*
Prove	ರುಜಕೇಕಪೆ *rujakékape.*
Pulse	ನಾಟೆ *náṭe.*
Purchase	ವೆಲೆಗಯೆತ್ತಕಪೆ *velegayettakape.*
Purge	ಪೆಟ್ಟೆಹೋಯಿತೊ *peṭṭehóyito.*
Purse	ಕೈಜೀರುಮೆ *kaijírume.*
Push	ವಾಬಕೇಕಪೆ *vabakékape.*
Putrid	ಕಿದ್ದೋಜೆ *kiddóje.*

Q.

Quake	ನಡಿಗೇಪೆ *naḍigépe.*

Quick	ತೈದ *taida*, ತರ್ರವರ *tarravara.*
Quench, spoil	ಕೆಟ್ಟಿಸ್ಕಪೆ *keṭṭiskape.*
Quite	ಯೆಲ್ಲಮೆ *yellame.*

R.

Rage (verb)	ಕೋಪಮ್ಮಾಡಕಪೆ *kópammáḍakape.*
Rain	ಮ್ಯಾಯೆ *myáye.*
Rain (verb)	ಮ್ಯಾಯೆಹುಸೊ *myayehuso.*
Rainbow	ಕೊರಂಗೂಳೆ *korangúḷe.*
Raise	ಯೆತ್ತಕಪೆ *yettakape.*
Raspberry	ಮುಳ್ಳುಪಿಲ್ಲೆ *muḷḷupille.*
Recite	ಯಿಂನೊಂದಪೇಟುಪಾರ್ತಕಪೆ *yinnondapéṭupártakape.*
Recollection	ನೆಪ್ಪು *neppu.*
Run	ವೋಡಕಪೆ *vóḍakape.*
Rat	ಏಜೆ *éje.*
Razor	ತಲವಾಲ *talavála.*
Reconcile	ವೊಂದಕ್ಕೀತೆನ *vondakkítena.*
Red	ಕೆಪ್ಪೆ *keppe.*
Refuse	ವೇಡನ್ನುಕಪೆ *véḍannukape.*
Regulate	ಸೆರಿಗೀಕೆನ *serigíkena.*
Release	ವಿಟ್ಟಿಸ್ಕೆನ *viṭṭiskena.*
Require	ವೇಕೆಂದಹರ್ತಿಕೆನ *vékendahartikena.*
Rend, tear	ಕೀರ್ಕಪೆ *kírkape.*

Rhododendron	ವಿಲಿಮರಮೆ *vilimarame.*
Rheumatism	ಜನಿ *jani.*
Rib	ಕರ್ಸೀಬೆ *karsíbe.*
Riches	ದೊಡ್ಡವದುಕೆ *doḍḍavaduke.*
Right	ಸೆರಿ *seri.*
Right hand	ವಲಕ್ಕೈ *valakai.*
Ring	ಮೋಡಾರಂ *móḍáram.*
Rise	ಮೇಕೀಕಪೆ *mékíkape.*
River	ಪೇಯೆ *péye.*
Road	ಆಳಾರೆ *aḷáre,* ಆಯ್ಡಾರೆ *áidáre.*
Roar	ಆರ್ಕಪೆ *árkape.*
Rock	ಎಱ್ರೆ *erre.*
Roof	ಪನಿಮೆಲೆ *panimele.*
Root	ವೇರೆ *vére.*
Rope of buffalo hide	ಮಿಲ್ಲಿ *milli.*
Rope of hemp	ನಾರೆ *náre.*
Rose	ಗಂಜೆಗುಳ್ಳೆಹೂವೆ *ganjeguḷḷehúve.*
Rotten	ಕಿದ್ದೆಕೊ *kiddeko.*
Rub	ಉದ್ದಸ್ಕಪೆ *uddaskape.*
Rubbish	ಪಬ್ಬೆ *pabbe.*
Ruminate, 3rd person	ಮೇಕಾಸಕೊ *mékásako.*
Run away	ವೋಸ್ಹೋಗಪೆ *vóshógape.*
Rust	ಕಿಲುಂಬು *kilumbu.*

Rusty (it is)	ಕಿಲುಂಬುಪಜ್ಜಿಕೊ	*kilumbupajjiko.*

S.

Sack	ಜೀರುಮೆ	*jírume.*
Salep plant	ನೈಗಾಉಳ್ಸು	*naigaulsu.*
Saliva	ಯೆಂಜೆಲೆ	*yenjele.*
Salt	ಉಪ್ಪೆ	*uppe.*
Salute	ಕೊಂಬುಟ್ಟುಕಪೆ	*kombuṭṭukape.*
Sand	ಮಣಲೆ	*maṇale.*
Saturday	ತೈನೆ	*taine.*
Satisfied (not hungry)	ಪೆಟ್ಟೆತೀವೆಕೊ	*peṭṭetíveko.*
Sauce	ಉದ್ದುಕೆ	*udduke.*
Scatter	ವೀರಿಟ್ಟಕಪೆ	*víriṭṭakape.*
Scratch	ಎತ್ತಕಪೆ	*yettakape.*
Scent	ಗಮುಲೆ	*gamule.*
Scent (impers)	ಗಮುಲೈಕೊ	*gamulaiko.*
Scorpion	ಜೇಳೆ	*jéḷe.*
Scull	ಮಂಡೋರೆ	*mandóre.*
Seal	ಮುದರೆ	*mudare.*
See	ನೋಟ್ಕಪೆ	*nóṭkape.*
Sell	ಮಾರ್ಕಪೆ	*márkape.*
Seize	ಪತ್ತಕಪೆ	*pattakape.*
Send	ಕ್ಯೇಪ್ಕಪೆ	*kyépkape.*
Set (the sun sets)	ಪೊತ್ತುಮಾರ್ಕಕೊ	*pottumárkako.*

Seven	ಯೇಳೆ *yéḷe.*
Seventeen	ಪತ್ತಿನೇಳೆ *pattinéḷe.*
Seventy	ಯೇಳ್ವತ್ತೆ *yéḷvatte.*
Sew	ಕುತ್ತಕಪೆ *kuttakape.*
Shadow	ನೆರಲೆ *nerale.*
Shake	ಅಳುಕಪೆ *aḷukape.*
Shame	ನಾನಮೆ *náname.*
Shameless	ನಾನಮಿಲ್ಲ *nánamilla.*
Shave	ಮಾನಿಕಪೆ *mánikape.*
She	ಅವಳೆ *avaḷe.*
Shell	ಸಂಕೆ *sanke.*
Ship	ಕಬಾಲ್ *kabál.*
Short	ಮೊಡೆ *moḍe.*
Shoulder	ಮೂಡೆ *múḍe.*
Show	ಕಾಟ್ಕಪೆ *káṭkape,* ಟೋರ್ಕಪೆ *tórkape.*
Shrub	ದಬ್ಬೆ *dabbe.*
Shut	ಅಡಪೆ *aḍape.*
Sick	ಹರುಸಮಿಲ್ಲ *harusamilla.*
Sickle	ಕಂಕತ್ತಿ *kankatti.*
Side	ವಕುರೆ *vakure.*
Sigh	ನರಿಕಪೆ *narikape.*
Sight	ನೋಟುಮೆ *nóṭume.*
Sign	ಗುರುತೆ *gurute.*

Silent (I am)	పక్కికపె *pakkikape.*
Silver	వెళి *veḷi.*
Sin	పాపుమె *pápume.*
Single	వొజ్జె ఆళె *vojje áḷe.*
Sister	అక్కనె *akkane,* కెర్దాసె *kerdáse.*
Six	ఆరు *áru.*
Sixteen	పదినారు *padináru.*
Sixty	ఆర్వత్తె *arvatte.*
Skin	తోళె *tóḷe.*
Sky	వానుమె *vánume.*
Slay	తౌవీకపె *tauvíkape.*
Sleep	వొర్రకపె *vorrakape.*
Slide, slip	జారవైపె *járavaipe.*
Slippery	జారిలు *járilu.*
Slope	వాగరె *vágare.*
Slow	పేమేం *pémém.*
Small	కున్నదు *kunnadu.*
Smarts, it	ఏర్సొ *érso.*
Smell (good)	వొళ్లెగములె *voḷḷegamule.*
Smell (bad)	నారొ *náro,* జిడివొత్తొ *jiḍivotto.*
Smile	కార్ధపె *kárdhape.*
Smoke	పొకె *poke.*
Snake	పాబె *pábe.*

Sneeze	ಟಿಪುಪೆ *tipupe.*
Snore	ಕುರ್ತಪೆ *kurtape.*
So	ಯಿಂಗೈ *ingai,* ಅಂಗೈ *angai.*
Son	ಮಗ್ಗೆ *magge.*
Sorcerer	ಬಿಲಿಕಾರನೆ *bilikárane.*

Sorcery (the Curumba pratices) ಕವಡೆ ವೋಡೆಸಿರ್ಕಕೊ *kavaḍe vóḍesirkako.*

Soul	ಉಸ್ಸುರೆ *ussure.*
Soil	ಬುಯಿಮಿ *buyimi.*
Sour	ಪುಜ್ಜಿ *pujji.*
Sorry (I am)	ದುಕಮಾಪೆ *dukamápe.*
South	ತೆಕ್ಕೆ *tekke.*
Sow	ವಿತ್ತುಕಪೆ *vittukape.*
Speak	ಮಾನಿಕಪೆ *mánikape.*
Spear	ಯಿಜ್ಜೆ *yijje.*
Spend	ವೆಚ್ಚಗೀಕಪೆ *vechchagíkape.*
Speech	ಪರ್ಸಂಗುಮೆ *parsangume.*
Spine	ಬೀವೆ *bíve.*
Spittle	ಯೆಂಜಲೆ *yenjale.*
Spit	ಉಳ್ಳುವೆ *uḷḷuve.*
Spider	ಜೇಲ್ದೆ *jélde.*
Spoil	ಕೆಟ್ಟಿಸಕಪೆ *keṭṭisakape.*
Spot	ಯೆಡಮೆ *yeḍame.*

Staff	ತಸ್ಸೆ	*tasse.*
Stand	ನಿಲ್ಲುಕಪೆ	*nillukape.*
Star	ಮೀನೆ	*míne.*
Spread	ಪರ್ತಕಪೆ	*partakape.*
Sprinkle	ಸೊಟ್ಟಕಪೆ	*soṭṭakape.*
Squeeze	ಹಿಂಡಿಕಪೆ	*hinḍikape.*
Starve	ಪೆಟ್ಟಿಗೆ ಏಕೊ	*peṭṭige éko.*
Steal	ಕಳ್ಳಕಪೆ	*kaḷḷakape.*
Steel	ಉಕ್ಕೆ	*ukke.*
Steep	ಅಟ್ಟೆ	*aṭṭe.*
Stench	ಜಿಡಿ	*jiḍi.*
Stink	ಜಿಡಿವಿಟ್ಟಿಕೆನ್	*jiḍiviṭṭiken.*
Step (noun)	ಹಜ್ಜೆ	*hajje.*
Sting	ಕಟ್ಧಕಪೆ	*katdhakape.*
Stool (to go to)	ಪೀತೂತಲ್ಹೋಗಪೆ	*pítútalhógape.*
Stop	ಅಡ್ಡಗಡ್ಡಕಪೆ	*aḍḍagaḍḍakape.*
Storm	ಕಾಟೆ	*káṭe.*
Straw	ಪುಲ್ಲೆ	*pulle.*
Stream	ಪೇಯೆ	*péye.*
Strike	ಪುಯಿಕಪೆ	*puyikape.*
String	ನೂಲೆ	*núle*
Strong (man)	ಸದ್ದುಗಾರನ್	*saddugáran.*
Sucks (it)	ಊಟೊ	*úṭo.*

Sugar	కల్లెనె *kallene.*
Sun	పొర్తె *porte.*
Sunday	ఆసవారమె *ásavárame.*
Sure	నెల్లమె *nellame.*
Swallow	నుంగివిట్టికపె *nungiviṭṭikape.*
Swamp	ఏకె *éke.*
Sweat	ఉరె *ure.*
Sweep	వొస్కపె *voskape.*
Sweet	సైవె *saive.*
Swell	వాతొ *váto.*

T.

Tail	వాలుమె *válume.*
Take	వేర్కపె *vérkape.*
Tall	ఉద్దు *uddu.*
Talk	మానికపె *mánikape.*
Tamarind	నబ్బుళి *nabbuḷi.*
Tax	కెండవణమె *kenḍavaṇame,* కజానా *kajána.*
Thatch	పుల్లెముచ్చుకపె *pullemuchchukape.*
Tempest	కాటె *káṭe.*
Ten	పత్తె *patte.*
Thirst	అర్పు *arpu.*
There	అల్లి *alli.*

Thief	ಕಳ್ಳನೆ *kaḷḷane.*
Thirteen	ಪದಿಮೂಡೆ *padimúḍe.*
Thirty	ಮೂವತ್ತೆ *múvatte.*
Tie	ಕಟ್ಟಕಪೆ *kaṭṭakape.*
Thorn	ಮುಳ್ಳೆ *muḷḷe.*
Thistle	ನೆಗ್ಗೆ *negge.*
Thread	ನೂಲೆ *núle.*
Three	ಮೂಡೆ *múḍe.*
Thumb	ಬೆಬೆಟ್ವರಳು *bebeṭvaraḷu.*
Thunder	ಗುಡಿಕು *guḍiku.*
Thunders, it	ಗುಡುಕೊ *guḍuko.*
Time	ಕಾಲಮೆ *kálame.*
Tiger	ಪುಜ್ಜೆ *pujje.*
Tinder	ತೂದೆ *túde.*
Tobacco	ಪೊಕೆ *poke.*
Token	ಕುರ್ಪೆ *kurpe.*
Tongue	ನಾಲಗೆ *nálage.*
Tooth	ಪಲ್ಲೆ *palle.*
Touch	ಮುಟ್ಟಕಪೆ *muṭṭakape.*
Town	ಪಟ್ಟಣವೆ *paṭṭaṇave.*
Transgression	ತಪ್ಪೆ *tappe.*
Trap	ಗೂಡೆ *gúḍe.*
Treasure	ಬೊಕುಸಮೆ *bokusame.*

Tree ಮರಮೆ *marame.*

Tremble ನಡೆಗಿರ್ಕಪೆ *naḍegirkape.*

True ನೆಲ್ಲೆ *nelle.*

Trust ನಂಬಿಕಪೆ *nambikape.*

Truth ಸತ್ಯ *satya.*

Tumble ವಿದಿದ್ಧೋಗಪೆ *vididhógape.*

Turban ಮಂಡೆಪೇರಿ *mandepéri.*

Tusk ಪಲ್ಲೆ *palle.*

Turn ತಿರಿಗಿಕಪೆ *tirigikape.*

Twelve ಪಂನೈದೆ *pannaide.*

Twenty ಯೀವಾಧೆ *yívádhe.*

Twig ಜಿಲೆ *jile.*

Twilight ನಡುಜಾಮ *naḍujáma.*

Twin ಆವಿಲೆಮಗ್ಗೆ *ávilemagge.*

Twinkle ಕಣ್ಣುಹೊಟ್ಟಕಪೆ *kaṇṇuhoṭṭakape.*

U.

Udder ಮೆಳೆ *meḷe.*

Ulcer ಪುಣ್ಣು *puṇṇu.*

Umbrella ಕೆಡೆ *keḍe.*

Uncertain ನೆಲ್ಲಮಿಲ್ಲ *nellamilla.*

Uncle ಕೆರಾಳೈಯನ *keráḷaiyana,* ತಲ್ಲಾಳೈಯನ *talláḷaiyana.*

Under ಕ್ಯೀಯೆ *kyíye.*

Up	ಮೇಕೆ *méke.*
Urine	ಮೊಳ್ನೀರ *moḷníra.*
Understand	ಅರ್ಕುಪೆ *arkupe.*
Unjust	ನಾಯಮಿಲ್ಲ *náyamilla.*
Urge	ಬಲುಮುತ್ತಗೀಕಪೆ *balumuttagíkape.*

V.

Value	ವೆಲ್ಲೆ *velle.*
Vegetable	ಸೊಪ್ಪೆ *soppe.*
Venereal	ತುರ್ಕಫಂಣೆ *turkaphaṇṇe.*
Vertex	ಮಂಡೆಕೋಟೆ *mandekóṭe.*
Vial	ಪೆಟ್ಟಿಗೆ *peṭṭige.*
View	ನೋಟಮೆ *nóṭame.*
Violence	ಬಲಮುತ್ತ *balamutta.*
Voice	ದೈನೆ *daine.*
Vomit	ಕಾರ್ಕಪೆ *kárkape.*
Village	ಪಟ್ಟಿ *paṭṭi.*

W.

Wait	ಕಾಟ್ಕಪೆ *kátkape.*
Walk	ನಡೆಕಪೆ *naḍekape.*
Wall	ಗೋಡೆ *góḍe.*
Want, famine	ಪಂಜಮೆ *panjame.*
Want (I)	ಯೆನಗುವೇಕು *yenaguvéku.*
War	ಪೋರಾಟ *póráṭa.*

Warm	ವೇವೈಯೆಕೇಕಪೆ *vévaiyekékape.*
Wart	ಜಟ್ಟೆ *jaṭṭe.*
Wash	ತೋಯಿಸ್ಕಪೆ *tóyiskape.*
Waste	ಕೆಟ್ಟಿಸ್ಕಪೆ *keṭṭiskape.*
Water	ನೀರೆ *níre.*
Wax	ಮೆಕ್ಕೆ *mekke.*
Way	ಅಳಾರೆ *aḷáre.*
Weak	ಸಮ್ಮತ್ತಿಲ್ಲ *sammattilla.*
Wear	ಬೇವುಕವೆ *bévukave.*
Wealth	ಅದಾರ *adára.*
Wed	ಪೇಟುಕೊಳಕಪೆ *péṭukoḷakape.*
Week	ಎಟ್ಟುನಾಳೆ *eṭṭunáḷe.*
Weigh	ತೂಕಪೆ *túkape.*
Well	ವಾವಿ *vávi.*
Well, good	ವೊಳ್ಳೆದು *voḷḷedu.*
West	ಮಾರಲೆ *márale.*
When	ಯೇಗೊಳ *yégoḷa.*
What	ಯೇನೆ *yéne.*
Wet	ನಾಂದೆ *nánde.*
Wheat	ಗೋದುಂಬಿ *gódumbi.*
Whistle	ವಿಳ್ತಕಪೆ *viḷtikape.*
Where	ಯೆಲ್ಲೆ *yelle,* ಯೇಯೆ *yéye.*
Whip	ಜಿಲುಕೆ *jiluke.*

Whiskers	ತಾಡೆಮೀಸೆ	*táḍemíse.*
White	ವೆಳಪೆ	*veḷape.*
Who	ಯಾರೆ	*yáre.*
Whore	ಸೂಳೆಮಗ್ಗೆ	*súḷemagge.*
Wide	ಅಗುಲುಮೆ	*agulume.*
Widow	ಮುದೆಗೇಡೆ	*mudegéḍe.*
Widower	ಮುಂದಿನೆ	*mundine.*
Wife	ಪೇಟೆ	*péṭe.*
Willow	ವೈಗೆಮರಮೆ	*vaigemarame.*
Wind	ಕಾಟ	*káṭa.*
Wipe	ವರ್ರಸಿಪೆ	*varrasipe.*
Wilderness	ಕಾಡೆ	*káḍe.*
Wing	ಪೆಕೆ	*peke.*
Wink (I)	ಕೈಸನಿಗಿಸುಪೆ	*kaisanigisupe.*
Witchcraft	ಪಿಲಿ	*pili.*
Wish	ಆವಲೆ	*ávale.*
With	ಸಂಗಡ	*sangaḍa.*
Wither	ವೊನಗಿಹೋಗಪೆ	*vonagihógape.*
Within	ವೊಳೆ	*voḷe.*
Witness	ಸಾಕಿಸಮೆ	*sákisame.*
Woman	ಪೆಂಮಗ್ಗೆ	*pemmagge.*
Wood, forest	ತೇಳೆ	*téḷe.*
Word	ಮಾತೆ	*máte.*

Work (I)	ಕೇಕಿಕಪೆ *kékikape.*
Worm	ಪೂವೆ *púve.*

Y.

Yawn	ಆವಟ್ ವಿಟ್ಟುಪೆ *ávaṭ viṭṭupe.*
Year	ವರ್ಷಮೆ *varshame.*
Yes	ಹೂದೆ *húde.*
Yesterday	ನಿಯರೆ *niyare.*
Yield	ವೊಬ್ಬಕಪೆ *vobbakape.*
Yoke	ನೋನೆ *nóne.*
Young	ಜೌವಾನೆ *jauváne.*

The letter ೞ placed under other letters, for instance ಇೞಕಪೆ, has a sound peculiar to the Hill tribes, something like ழ in tamil, but not exactly so. It will be observed how many words terminate in é (ಏ). The frequent occurrence of this vowel, which the Kotas utter in a nasal pronunciation, makes their language any thing but agreable to the ear.

OCCUPATION OF THE HILL TRIBES.

Nearly the whole life of a Toda is spent in idleness. Except milking the Buffaloes and making ghee from the produce of their herds, no real work is done by the Todas. Even the milk business is to the greater part

performed by one man in each village, whom they call the Pālicārpāl, and who alone is allowed to go into the dairy, which is considered a kind of sanctum in each Mand. In the harvest time the men go about in all the Badaga villages, and raise their tax in grain, which they call *gŭdŭ*, and to which, the Badagas believe, they have, as the lords of the soil, a certain right, but I have been witness a great many times when it was only by the greatest force that the Todas could get something from their tenants. And if the Badagas were not afraid of their enchantment, they certainly often would refuse to supply the lazy fellows, whom they call Pitchekārar, with the means of their subsistence. Also the Toda women are as lazy as their husbands, and except preparing the meal for the family, do nothing at all. They sometimes during the absence of their husbands sit for hours together, talking and laughing, and curling their hair.

Though the Badagas also do not know much of the value of time, still they cultivate their ground, and in the sowing and weeding season expose themselves to the inclemency of the weather very much, and I have no doubt if they were more industrious, they could easily supply themselves with grain enough to live upon, but as this is not the case, a very large quantity of *Rāgy* comes up from the low country every week, which the Badagas buy and consume. The Badaga women are very industrious, and not for an hour they can be seen idle. If there is no work in the field, they bring firewood to the house, or do something else for the benefit of the family. Chiefly on this account a youth has to give a very large dowry for his wife, sometimes 150 and 200 Rs. because he knows her usefulness. Also they have more modesty, and are not so forward as the Toda women, at least not towards strangers. The Government tax, which the Badagas pay for their land and buffaloes, is comparatively high

but for a little bribery the Kanaka or village Accountant can always manage it to make it a little lower.

The productions of the soil are the following:—

1. Nilgherry wheat and Nilgherry barley.

2. European wheat and European barley introduced by Mr. Sullivan. Barley has degenerated very much; and for the last years, the Badagas preferred their own, because they had a better harvest of it. Formerly it was the contrary, and also this year having had plenty of rain, the *Dorre gānje i. e.* Gentleman's barley looks beautifully.

[Vetches and oats were also introduced by Mr. Sullivan, but the natives did not make any use of it.]

3. The most common grain is what the natives call *Korrali,* which is a very rough kind of millet, and grows in the colder districts Kundenád, and Mekanád, where the other finer grains do not grow. As they cultivate the same piece of ground, only every 3d or 4th year, it grows very well without manure except the bushes, which are cut down and burnt.

4. *Sāmé* (panicum miliare) which is considered the best kind of the several small grains of the Hills. If grows in the warmer districts, it must have richer soil than *Korrali.*

5. *Ténnéy* or *Navoney* (panicum italicum) which also grows only inwarm places. It is considered indigestible, on which account only a small quantity is cultivated and always eaten mixed with some other grain.

6. *Varagu* (paspalum frumentaceum) which grows only on the slopes of the Hills in feverish places, and requires, it seems, a warmer climate than the Hill plateau affords.

7. *Ragi* (cynosurus corocana) grows also only in places where the cold monsoon wind cannot come to. This grain the natives say will remain good for 30 years if it is kept in dry places.

8. A kind of pea (cicer arietinum) generally sown when the *Ragi* is cut down.

9. *Manalige* (a kind of lentil) used for currystuff.

10. *Meté* (trigonella fœnum græcum) sold to the low country merchants.

11. Onions and garlic very small but of a fine flavour. They are generally sold to merchants, who come up from Coimbatoor, and carry large quantities down on bullocks.

12. Opium of a very good kind, the curse for many of the inhabitants of the Hills, who use it first as medicine against any disease they are troubled with, and then get incurable opium eaters. Many of the Kotas boil the shells of the poppy to get a stupifying beverage from them.

13. *Pasambu* (calamus aromatícus) is not cultivated but grows nearly in every swamp, and is sold to the Coimbatoor merchants.

II. *On the Geological age of the Sandstones containing Fossil Wood, at Trivicary, near Pondicherry. By* H. F. Blanford, *of the Geological Survey of India.*

The sandstones occurring at the village of Trivicary near Pondicherry have long been known to Indian Geologists from their containing in considerable quantity the silicified remains of the stems of trees. These beds were first brought to public notice, by the late Mr. Kaye, of the Madras Civil Service, in his paper on the Geology of the Country around Pondicherry, published in Vol. Part of the 6th Transactions of the Geological Society of London. In the same paper are also described certain other sandstones occurring at the village of Verdoor Valudayur, four miles South East of Trivicary, and a large series of fossils collected from these rocks, by Mr. Kaye, and Mr. Brooke Cunliffe, were sent home and described, by the late Professor Edward Forbes, in the admirable Monograph which accompanies Mr. Kaye's paper. From these fossils Professor Forbes determined the Verdoor sandstones to be of cretaceous age, and he stated his opinion that they were about coeval with the lower cretaceous or Neocomian rocks of Europe. The age of the Trivicary sandstones however still remained doubtful, and no decided opinion was enunciated on the subject, until in the course of last year, Mr. Adolphe Schlagentweit published in the Journal of the Asiatic Society of Bengal,* his "Report on the Progress of the Magnetic Survey, &c. from November 1855 to April 1856."

In this Report Mr. Schlagentweit having described the great series of sandstones and plant-bearing beds throughout Central India and portions of Bengal, and assuming the Trivicary sandstones to be of the same age, says:—"With reference to the difficult question of the age of the sandstone formation, it is worth mentioning that I have seen the sandstone with fossil trees clearly overlaid by the cretaceous strata, the Pondicherry district, so that it cannot be younger than Jurassic," and further on:—"The cretaceous strata seem to have been quite undisturbed; they rest horizontally upon the oolitic sandstones of Trivicary, and upon the crystalline schists in other localities," and as these sandstones coin-

* No. II for 1857.

cided with an opinion on the age of the sandstones of Central India previously put forward, by Mr. Hislop,* the question seemed so far decided, viz. that the Trivicary sandstones were older than the cretaceous epoch and in all probability Jurassic.

In December last, the Madras party of the Geological Survey of India, commenced the detailed survey of the South Arcot and Trichinopoly Districts, and proceeded in the first place to examine the relations of the Trivicary and Verdoor sandstones in order to gain a distinct knowledge of their relative superposition before tracing out those rocks into other portions of the district. This portion of the work has been now completed, and the result is that the relative superposition of the beds in question proves to be precisely the reverse of that which Mr. Schlagentweit imagined to be the case. As this is a subject of somewhat critical distinction, and will in all probability prove of great importance to the true comprehension of the geology of a large portion of India, it is advisable to state in some detail the grounds upon which the above determination has been arrived at.

Immediately to the east of the village of Trivicary and stretching thence for a distance, of about half a mile in the direction of Verdoor and Pondicherry, are a series of small irregular sandstone bluffs much eroded by the denuding action of fresh water, and forming a prominent and striking feature in the surrounding landscape. On near inspection these bluffs are seen to be composed of coarse sandstones much false-bedded and irregularly banded with brilliant tints of lilac, orange, pink, white, &c.; they are rarely conglomeritic, considerable quantities of silicified wood are scattered over the surface of the ground, and here and there large masses of the same are seen protruding, from the sandstone in *situ*. The sandstones are of no great thickness, for so far as can be judged they appear to be nearly horizontal and on their western boundary or towards the village of Trivicary, are seen in several places resting immediately on the crystalline rocks, which everywhere form the bottom rock of the country. The small bluff which bounds this elevated patch of sandstones, is very conspicuous both in its west-

* Quarterly Journal Geological Society of London, Vol. XI. p. 457.

ern and eastern limits in the neighbourhood of Trivicary, but to the north it dies away gradually, and the sandstones themselves disappear beneath a thick covering of soil, and are only occasionally visible when laid bare in the beds of the small water-courses. A thick deposit of sandy soil laps in a similar manner, round the foot of the eastern bluffs and conceals the underlaying rock, except in the immediate neighbourhood of the river, where gneiss is seen in *situ*, and from its position, is evidently cropping out from beneath the sandstones. Cretaceous rocks resembling those at Verdoor are no where seen in contact with these beds except that at one point an isolated block of yellow sandstone containing cretaceous fossils, which from its appearance, I judge to have been recently dug up, from the soil on the spot on which it rests, is seen at what appears, to be the boundary of the sandstones. No cretaceous rocks whatever are here seen in place.

There is great reason to believe, judging from the color and appearance of the soil* that from Trivicary, the tree-bearing sandstones extend for some distance to the East and overlap a portion of the cretaceous rocks, as shown in the accompanying map and section, but as in the absence of any sections on any rock whatever seen in *situ* over this tract of country, it is impossible to *prove* the fact, we must seek elsewhere for reliable proofs of superposition, and to do this, we pass to the country between Verdoor and Pondicherry.

About two miles N. W. of Pondicherry, the Madras road ascends and passes for about three miles over a tract of elevated country, characterized by a red sandy soil, from beneath which a lateritic gravel is dug in places to metal the road. This elevated tract extends from the south east corner of the great Oosatary tank, four miles west of Pondicherry to the village of Mundakuppam on the coast 10 miles north of Pondicherry and along the greater part of its boundary is terminated by a small escarpment of about 30 feet average elevation. The streams which carry off the drainage of this little plateau have cut deeply into the rocks composing it at several places along the escarpment, and expose Oosatary gritty sand-

* This character, vague and unreliable as it may appear, has been found to be an excellent indication of the presence of certain rocks throughout the district.

stones and conglomerates, sometimes of a deep red color, at others mottled and banded with various colors, and containing occasionally, although rarely, large unrolled fragments of silicified wood precisely similar to those found at Trivicary.

To the east of the Oosatary tank the sandstones are especially well exposed in the *gullies* cut by several small streams flowing down to the tank, and may be seen at several places, resting on finely grained soft yellow sandstones which contain in some places a few very imperfect but recognizable cretaceous fossils and are proved to be the upper beds (as here seen) of the cretaceous series. It is therefore beyond the remnant of a doubt that the coarse sandstones of Pondicherry, are newer than the cretaceous beds.*

The next step in the investigation is to trace out the identity of these beds, and the coarse grits at Trivicary. In ascertaining this point the greatest care has been exercised, and the two areas were repeatedly and alternately visited in order to compare thoroughly the two series. The results of this investigation are :—

1st. The sandstones at Trivicary, and those at the Oosatary tank present precisely the same lithologic characters. They are both very coarse ferruginous grits containing minute particles of what appears to be kaolin interspersed with the grains of sand and giving them a white speckled appearance. In both localities, they are very variable in color, but the most characteristic varieties both at Trivicary and the tank are variegated, with irregular bands of lilac, pink, and yellow, frequently very brilliant in color. They are both occasionally somewhat conglomeritic especially towards the bottom, and in their false bedding, their irregular segregation and all lithological characteristics, they are quite undistinguishable.

2nd. The Trivicary grits contain fossil wood in great quantity, while the Oosatary beds contain it only very sparingly, but it is in both places apparently identical, and in both cases perfectly silicified and unrolled. Moreover, that the abundance of fossil wood is a very local character, is proved by the fact, that in the evident extension of the Trivicary sandstones to the North, the fossil wood

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* The extension of these sandstones to the south of Cuddalore is seen in many places resting on the cretaceous rocks very unconformably. At Verdachellum they rest on the lowest beds of the cretaceous series whereas 20 miles to the south of this, they are seen resting on beds about 3,000 feet up in the same series.

seems entirely to disappear, at the distance of about 2 miles, whereas the Oosatary beds are 8 miles distant.

3rd. Both at Trivicary and towards the coast, the sandstones form an elevated tract bounded by a small escarpment, more or less perfect. The similar developments of grits to the southward, such as those occurring at Cuddalore in the Capper Hill, and at numerous other places since visited, by the Survey are all similarly characterized. Indeed, the continuity of the Oosatary beds and those of the Capper Hill, has only been destroyed by the breaching action of the Panar and Ariancupom rivers, and the interspace is now occupied by the alluvium deposited bythese rivers.

4th. Whenever throughout the district, the bottom beds of the cretaceous series have been seen, they rest immediately on the gneiss, whereas, as has been mentioned in the note p—the southern extension of the Oosatary beds rests very unconformably on the cretaceous rocks, so much so that it is easy to be comprehended, that at Trivicary they should overlap these latter, and rest also on the gneiss.

5th. From these results which have been verified by repeated examination, the only legitimate conclusion that can be drawn, although in distinct opposition to Mr. Schlagentweit's statement, is :—*that the Trivicary sandstones are identical with those of Oosatary, therefore newer than the cretaceous beds and unconformable to them,* the cretaceous rocks having been upheaved and denuded partially only at the Oosatary tank and other places, entirely at Trivicary, previous to the deposition of the tree-bearing sandstone. That Schlagentweit should have been mistaken, in his reading of the Geology of Trivicary is no more than might have happened to any one who made so very cursory an inspection of this rather difficult district as that gentleman, for it will be observed from Mr. Schlagentweit's report that in the space of one fortnight, viz. from the 24th April to the 10th March, he visited the whole of the country between Madras and Trichinopoly, and travelled thence to the Neilgherry Hills, a distance altogether of 370 miles. It is however exceedingly to be regretted that any man of acknowledged scientific attainments should make so decided a statement as that quoted from Mr. Schlagentweit's paper, especially on a point of really critical im-

portance such as the present is, unless he has fully and carefully satisfied himself of its absolute certainty. A statement so distinct as Mr. Schlagentweit's would never be questioned by any one, who had never visited the locality referred to, and how much false reasoning it may give rise to, may be seen by perusing Mr. Schlagentweit's own paper, wherein from the single observation at Trivicary, the author rests his inference of the age of the great sandstone and plant-bearing series of central India and Bengal.

It is difficult to imagine what Mr. Schlagentweit could have been thinking of that could lead him to make so positive a statement as that quoted ; the cretaceous rocks, especially those of Pondicherry, differ so markedly in appearance from the tree-bearing sandstones that it is scarcely to be supposed that Mr. Schlagentweit mistook any of the upper beds of the tree-bearing grits for cretaceous rocks, and yet this seems the only possible explanation of the error, for the contour of the ground, and the dip of the beds, so far as can be made out, would rather point to a different conclusion. As Mr. Schlagentweit has however promised a detailed account of his Geological observations in India, he may possibly be able to throw some light on the cause of his mistake.

POSTSCRIPT.—The above paper was written in camp shortly after the survey of the country of which it treats, and where I had but very few works of reference at hand. I was thus unaware of a fact, which I have now great pleasure in acknowledging, viz., that the true order of superposition of the Trivicary sandstones with reference to the cretaceous rocks of Verdoor was fully known to Captain Newbold, who published his notes respecting these rocks in the Asiatic Society's Journal, Vol. XIV, and subsequently in his paper on the Geology of India, published in Vol. IX of the *Calcutta Review*, stated his views on this subject very clearly. I deem myself fortunate that an accidental delay in the publication of my paper has afforded me an opportunity of supplying a grave omission, and of doing an act of justice to one of the most philosophical and energetic of that noble band of investigators who have been the voluntary pioneers of Science in India.

III. *Notes Antiquarian and Mythical.* *By* M. J. WALHOUSE, ESQ., C. S.

I.

THE worship paid to rough stones is a curious and widely spread feature in the ancient religions, and in the majority of its phases appears to have been connected with that phallic or lingam worship, which now confined to India, prevailed in early times throughout Southern and Western Asia, and even penetrated into Europe. It is the object of this notice to bring together some of the more remarkable indications of its existence; though in such an attempt there is always the danger of repeating what has been before presented in the many scientific publications of the day, possibly in this very Journal. None however can pretend to be acquainted with all that is, and has been published, on any particular subject, for the rest "*pereant malè qui ante nos nostra dixêre.*"

The shape in which the reproductive power is popularly typified in this country is well known; from the rude elongated stone set up under every green tree, to the massive cylinders of hewn rock, black with oil, in their celled shrines, in the τεμενος of some ancient pagoda. There is a conspicuous instance at a remarkable point where the Cauvery after running 50 miles through an almost untrodden wilderness of hills and jungle eastward from the Falls of Sivasamudram, turns south on its way to the rice-fields of Tanjore. At the bend the river spreads into a broad expanse, the banks level with the water, and from the middle of the flood a column, apparently of white smoke arises and drifts away upon the wind. This remarkable appearance is due to some deep hidden chasm into which the water falls and sends up a cloud of spray-mist: but standing, as one does, on a level with the water, no rocks or cleft are visible, and the wreath of vapour ascends, precisely like smoke, from the seemingly unbroken bosom of the stream. This spot is called—a Canarese dialect prevailing there —Hogênakallu (smoke-rock) and immediately opposite it on the eastern bank stands a hoary old pagoda round whose inner enclo-

sure is arranged a long line of 10 or 12 huge lingam stones, each in its separate cell.

Returning to the vestiges of lingam worship in very ancient times, evidence is not wanting of its prevalence under its worst aspect in Phœnicia—the scriptural Canaan—from whence it crept into Palestine itself, nay, as Mitchell has shown with the highest probability into the very Temple of Jehovah. In the account in Kings and Chronicles of the idolatries introduced by the wicked King Manasseh, he is said to have " set a carved image, the idol which he had made, in the house of God," and " a graven image of the grove that he had made in the house," &c. In the words rendered " carved images" the learned Bate and Porkhurst both unite in seeing an idol dedicated to licentious rites, the same with that image stigmatised as " provoking to jealousy" which Ezekiel saw defiling the gate of the altar, and closely connected with that idol the setting up of which induced Asa to depose the queen-mother Maachah. The nature of the idols as not directly mentioned, the Scriptures preserving a marked silence on this point throughout their record of the abominations introduced by the idolatrous Jewish monarchs, but may be at once inferred when it is known that the radical letters of the name of the idol set up by Maachah present the identical word *phallus*, which, without meaning in Greek, becomes plain enough when referred to its Hebrew derivation. The punishment inflicted by the righteous Asa on his own mother shows his sense of her enormity, and the haste made by Manasseh to remove that particular image from the house of God, when chastisement befell him, manifests the deep guilt of its introduction there.

In the second or Mosaic covenant, under which the Jewish polity was finally consolidated, it is written " Thou shalt not plant thee a grove of any trees near unto the altar of the Lord thy God, which thou shalt make thee : neither shalt thou set thee up any image (pillar) which the Lord thy God hateth." (Deut. xvi, 21, 22.) Elsewhere in the first or Divine covenant, and throughout the Prophets, the erection of " groves" and " statues" is undeviatingly denounced as the most offensive form of Canaanitish idolatries. When in addition to the " graven image of the grove" set up by

Manasseh, we recal Josiah's "bringing out the grove from the house of the Lord without Jerusalem, unto the brook Kidron, and stamping it small to powder," it is plain that in these and several other passages, to be intelligible, some other meaning must be attached to the word rendered "grove." That word in the original is Ashera, and Gesenius thinks that wherever it occurs it signifies an idol, though Porkhurst from the expression 'plant' and 'trees' is of opinion that in the above quoted prohibition at least a grove must be meant. As has been observed, however, the word translated *trees* is a noun singular, and the command may be understood as forbidding to set up an Ashera of any kind of wood (compare Isaiah xliv, 14 to 19.) The Asherim were nearly always connected with certain pillars, mistranslated statues in the authorised version ; it is not necessary to go into the evidence for believing these pillars to have been of a most abominable character, heightened probably by a revolting addition ; it is enough to point out that the setting up of the Asherim or the pillars, usually the two together, is invariably denounced as the deadliest crime of the apostate Kings, whether of Israel or Judah. Against them the indignation of the Prophets burnt hottest, and the express commands to break and hew them down marked them as the particular objects of divine wrath. (Exod. xxxiv. 13. Deut. vii. 5.) On the nature and worship of these pillars and the Ashera idol there is no direct testimony, but when we find Herodotus declining to enter into particulars of the rites of the country from whence they were derived on account of the pain and loathing it would cause him, and call to mind some of the Jewish laws directed against the practices of the Canaanitish temples, it is easy to conjecture the reason of the guarded silence maintained by Scripture on the point. Enough that there are good grounds to conclude that the Ashera rites included lingam worship in its grossest form and with its most polluting ceremonies. The very tradition has now disappeared from that land, whereas there is weighty reason to think, it profaned in its worst shape the very house of God ; so too may it pass away from the regions where it lingers latest.

In succeeding times the signification of the lingam emblem appears to have become forgotten or obscured, as in some degree it

is in India.* Tacitus in his Histories (II. 3) describing the temple of Venus in Cyprus says, " the image of the goddess is not in human shape, but an elongated circumference, broader at base and tapering in girth upwards : its meaning obscure." And Maximus Tyrius in his 38th Essay writes " The Paphions adore Aphrodite, but her image you could liken to nothing but a white pyramid." Taken in connection with aphrodisiac worship what could these have been but lingams ? Herodian in his 5th book thus describes the image of the Sun at Emesa, called by the Phœnicians Elaiagabàlom, and worshipped not only by them but by the neighbouring kings and satraps. " It has no form of a statue, but is a very large stone, round at bottom, and tapering sharply conelike, its colour black ; it is said to have fallen from the sky, and to be an unformed image of the sun." Probably a meteorite, uniting both solar and phallic worship—rites, as could be largely shown, almost necessarily running into one another. In other instances when we find Lucian in his Pseudomantis saying of a religious fanatic " that if he should anywhere see a stone anointed with oil or crowned with flowers, he would straight fall down and worship it for a long time, beseeching good luck of it," and Theophrastus in his characteristics of a superstitious man describing him " on passing by an anointed stone in the cross-roads, as taking oil from a little flask, falling on his knees and adoring it," we have only to walk along any Indian road to perceive the kind of stones referred to, anointed and garlanded the same as those of classic days.† The stone said to have been devoured by Saturn in mistake for Jupiter and relat-

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* It is noteworthy that whereas in India the *lingam* assumes a conventional and inoffensive shape ; the *phallus* in Asia Minor and the antique world generally was in the grossest and most objectionable form. Hence though the latter was familiar to the ancients, the former when it occurred was misunderstood by or unintelligible to them. It should not be overlooked that the phallic type in its most exaggerated form, was especially connected with Bacchus *as conqueror of India.* Witness the two colossal phalli, each 300 fathoms high, placed by Bacchus in the vestibule of the great Syrian temple, *after his return from his Indian expedition.* (Lucian, de Syriâ Deâ.) In that most prodigious of recorded processions, the great Bacchic pomp celebrated by Ptolemy of Alexandria, we read of a golden phallus 120 cubits high, crowned by a bright golden star 6 feet round. (Athenæus, Lib. V.)

† A friend writes that in the Kunawur Province and high Himalayan villages a stone is set up as a pillar in the fields, its centre and top smeared with white wash, and the top marked with five finger-marks of red ochre ; on this flowers are offered for the prosperity of the field. So too in Southern India the white-washed splinter of stone, tipped with red, may everywhere be seen placed under a tree in fields or gardens, crowned with a few flowers.

ed by Pausanius to be placed in the temple at Delphi, and anointed daily with oil, seems very like a lingam. The practice of anointing stones with oil dates from the days of the patriarchs, and is no doubt the cause why in most instances sacred stones are described as black. Porphyry informs us that the Deity was represented as a black stone as being of obscure and inscrutable nature. The ancient Arabians, says Maximus Tyrius in the above cited Essay, " Worship I know not whom, but the image I saw was a quadrangular stone," from Suidas we further learn it was black, and is evidently the same meteoric stone now preserved in the Caaba at Mecca.‡ The chief idol of the Germanic tribes, the Hermansaul, appears to have been at first a tall black stone. In Gladwin's Clyeen Akbari is mentioned a pillar of black stone, octagonal, and 50 cubits high before the gate of the Temple of the Sun at Jaganath. A good Mussulman must needs be a bad mythologist, but it is hard to conjecture what could have led the Emperor to see a sun-temple at Jaganath. Hindu fanes do not readily change, and nothing of the sort can be gathered from an account of Puri and Jaganath published some years ago in English by an intelligent native. Were it so, there would be a remarkable coincidence between this and the Phœnician sun-pillar the Elaiagabàlom. Captain Hamilton, apparently referring to the same object, describes an idol at Jaganath as a huge black pyramidal stone, (it must exist there now, qu. how is it regarded ?) Similar was the Siamese Sommonocodom. In Masson's Travels the idol of the mysterious Sia-posh of Central Asia is affirmed to be " an erect image of black or dark coloured stone the size of a man." The aboriginal tribes of Rajmahal worship a black stone in an enclosure.

The foregoing instances give evidence of the wide diffusion in ancient as well as in recent times of a black stone worship in which the symbol, nearly always of a peculiar shape, appears to have been, more or less openly, an emblem of reproduction. In some cases the signification may have become obscured, but that

‡ Hardly less remarkable have been the fortunes of another black stone, that on which the King of Ireland was crowned, called the Stone of Destiny ; if the coronation was auspicious it emitted a clear sound. This palladium or national talisman, was afterwards brought to Scone, and thence carried to Westminster, and placed under the old coronation chair, where it still remains.

such was generally the original meaning can be as little doubtful as that the May-day dances and poles in England are a relict of the phallic rites of Pagan times. Setting aside the Druidical upright stones, generally sepulchral, and the figured or scriptured stones, so perplexing to antiquaries in Scotland and elsewhere, there seems to have been a tendency in primæval races to deify mere rough stones or at least to choose them as symbols of their gods. Even in the sacred writings Jehovah is emphatically called the Stone of Israel—the Rock, (Gen. xlix. 24, Deut. xxxii. 4, 30, 31,) and Jacob called the stone he erected at Shalem El elohe Israel—the God of Israel, (compare Exod. xvii. 15,) but these plainly referred to the idea of strength and steadfastness. The Alexandrine Chronicle relates that the Assyrians first set up a rude pillar and worshipped it as a god, and Pausanias, expressly affirms that in the most ancient times amongst the Greeks rough stones (*ἀϱγοι λιφοι*) were reverenced instead of images. The same author mentions that Hercules was represented at Hyetta by a rude stone according to ancient usage. So was Juno at Samos, and even the Graces at Orchemenos. The ancient Laplanders worshipped rough stones, called Seitch, and the adoration paid to the same objects formed a principal feature in the religion of the Arabians before Mahommed. Eusebius says the Earth was symbolised by a cylindrical stone, and Mr. Masson reports that in the temple dedicated to the goddess at the foot of the Kah Assa Mahi (Hill of the Great Mother, *i. e.* Nature,—" Magna Mater.") Near Cabul " a huge stone is the object of adoration." Michelet sees traces of stone-worship in France in the numerous towns bearing the name of Pierre Fiche, *i. e.* a rough unwrought stone simply fixed in the ground like a post.

It is not easy to penetrate the idea that led so many people in such various countries, periods and stages of development, to select rude stones, rather than other natural objects as emblems of their religious conceptions. The sentiment is conceivable that deified the sun, the heavenly bodies, the cow, rivers, &c. and a striking aerolite might here and there rivet the awe and worship of the surrounding tribes, but it is not so clear why common shapeless stones should so generally have been elevated to divine honours.

Possibly a remnant of the old chaotic fetish worship of half-conscious man ; then as the mind opens, the first abstract idea that develops itself in primæval races is of that reproductive energy of Nature which, more or less veiled, is the ultimate idea and principle underlying all heathen systems and deities. And of this the earliest and rudest expression would be some form of the lingam, most readily typified by the stones scattered around. But the whole assumption may be questioned, and is beset with difficulty and incoherencies.

II.

In the Reverend W. Taylor's " Oriental Historical Manuscripts" Vol. I. pp. 112-114, there is an account from an old Tamil Chronicle of a contest held between the Samanal or Buddhists and the Brahmans, in which both parties submit their respective claims to orthodoxy to this ordeal, viz., that each writing a prayer or charm upon palm leaves, and casting the same into a river, that side whose leaves should ascend against the stream should be declared to hold the true faith. Upon trial every leaf of the Samanals was carried down with the stream, and those of the Brahmans alone ascended. The former, 8,000 in number, notwithstanding the miracle, refusing to be convinced or accept the Saiva faith, " with obstinate prejudice" (saith the Brahman chronicler) " put themselves on the impaling stakes," the penalty previously agreed upon for the losing party. Mr. Taylor in his notes at pages 182-183, states that the impalement of this army of martyrs is unquestionably a historical fact, and commemorated to this day by a mimic representation. He is further of opinion that Buddhists, Samanals, and Jainas are terms denoting substantially the same sect. It is upon the name Samanal (சமணள்) that a few remarks occur. Adverting to Sarmana Cardama, the son of Mahiman, a form of Siva, identified with Gantama or Buddha, and the same with the Siamese Sommono Kodom, Mr. Taylor conjectures Sommono and Sarmana to be the origin of the term Samanals, and dialective variations of Sarvamanu, an universal or very illustrious sage. Porphyry makes particular mention in his work De Abstinentiâ (Lib. iv. cap. 17) of a sect called Samandans, who appear to have been great travellers and proselytisers, and to have had a kind of

monastic discipline. Faber has this passage. " Both Cyril and Clemens Alexandrinus agree in telling us that the Samandans were the sacerdotal order both in Bactria and Persia ; but the Samandans were the priests of Saman or Buddha, and it is well known that the sacerdotal class of Bactria and Persia were the Magi : therefore the Samandans and the Magi must have been the same, and consequently Buddha, or Maga, or Saman must have been venerated in those regions." Pagan Idolatry, B. iv. chap. 5. To this conclusion (so notably Faberian in hunting a verbal resemblance) that the Magi and Buddhists were the same, few would probably now assent. With equal reason might it be asserted that the rude Shaman priests and tumultuous Shamanite ceremonies of Northern Asia, which have been shown by Mr. Caldwell, not merely to resemble, but to be absolutely identical with, the popular devil-worship of the rural Tamil castes, are the same with the philosophic Samanal Buddhists. But with respect to the names Samanal, Saman, the following passage from M. Adolphe Pictet on the Cabiri may be adduced, carefully abstaining however from entering far into a subject so obscured by mysticism. " He in whom this (the Cabiric) system finds its unity is Samhan, the judge of souls, who punishes them by sending them back on the earth or to hell. He is Master of Death, on the eve of the 1st November he judges the souls of those who had died in the preceding year : that day still goes by the name of Samhan's night. Samhan is the centre of the association of the Cabiri ; *sam*, *sum*, *cum*, imply union in a multitude of languages."* Turning to Rottler's Tamil Dictionary we find *sub voce* " Saman, *the regent of death*, same as Yama," and Sami or Avhat is the deified sage or god of the Samanar or Buddhists. This coincidence, functional as well as verbal, is almost too strong to be accidental. No theory even has sought to establish any connectisn between the mysterious worship of " the great gods of Samothrace," and the Buddhistic system. If, however, Pictet and also Schelling be right, in interpreting the Cabiric theology as a worship of the primal powers of nature, ascending

* The derivation from " sam" union, certainly seems preferable to Mr. Taylor's derivation from Sommono (unless that too be from the same root.) It is noticeable that in the account of the contest the name of the Brahman (in truth Siva in disguise) who defeated the Samanal is Sampanton, *i. e.* " agreement," upon which meaning of the name there is an equivogue in the original story.

through a series of stages and developments up to the great central creative unity, and so the reverse of a system of emanations, it includes one main point of agreement with Buddhism, a capital distinction between which and Brahmanism is, that whereas the latter is always inclined to the idea of avatars or divinities descending and becoming visible in earthly forms, so Buddhism contrariwise elevates its sages and heroes through successive ascending states to one of identification with pure deity. Buddhism too has always been an eminently migratory creed; Porphyry notices the wandering propensities of its professors, and in this it again coincides with the Cabiric divinities, Hercules, Jason, Œneas, Dido, and other mythical personages, all notable wanderers of old. Here are lesser likenesses, besides that crowning one of identity of name and function between the heads of the respective systems. All may be mistake; but when one recalls the unexpected agreements, strange coincidences, and unaccountable correspondences with various Buddhist peculiarities, that sometimes essential, sometimes trivial, crop out in so many far separated countries, creeds, and ages, one is almost disposed to listen to those keen partizans who would extend the sway of Buddha from uttermost east to farthest west —to Britain and Ireland; not scrupling to claim even Stonehege as a Buddhist temple. Shadowy glimpses in "the dim backward and abyss of time" of a period in unrecorded antiquity when Buddhism formed a vast, primitive, universally prevailing system, into which, at or after the historic epoch, Brahmanism in the east and manifold mythological religions in the west, broke and eventually overthrew. Fading for ever from the western world, in which the vestiges of its predominence only perplex, re-appearing at times in India, always to be subdued, but lingering in some of the adjacent countries, the antique faith in its unapproached strongholds of the remotest east, still counts its myriads of followers, outnumbering those of any other creed. One is sometimes tempted to speculations like those, were there any solid basis to build them on.

III.

Analogies have been traced between Asiatic mythologies and the religion established in ancient Scandinavia by Odin, who is

supposed by some to have led his Asen—Asian or Scythian hordes—from the regions between the Euxine and Caspian to Northern Europe, but the Chinese mythology has generally appeared to stand alone and unconnected. There is, however, one striking myth common to Scandinavian and Chinese traditions. According to the Woo-yun-leih-nien-ke, as given in Gutzlaff's "China Opened," Vol. I. p. 299, "an original etherial principle by its vapour impregnated matter, so as to produce Heaven and Earth, and the Yong and Yin, and having become pregnant, Pivankoo the first of this race was born, when he died the hair of his body was metamorphosed into wind and clouds, his voice into thunder, his left eye became the sun, the right the moon, the various members of his body the four poles and five high mountains, his blood and fluids rivers and streams: his sinews and arteries were changed into land, the hair into stars, the teeth and bones into minerals, and the vermin adhering to the body were transformed into men." This myth is identical with the story in the Edda of the giant Ymir, a personification of chaos or unformed primal matter who was born from the living drops that were formed from the melting of the icy vapours exhaled from the abyss. Whilst he slept a man and a woman sprang from an extraordinary sweat under his left arm. Odin and his brethren slew him, and formed the universe from his body precisely as in the Chinese legend: his scull became the vault of heaven, his brains were tossed up and became the clouds, his teeth and bones formed the rocks and hills, his blood and juices the sea and rivers, his flesh the earth, &c. It is remarkable that so peculiar a myth should appear in the cosmogonies of such very widely separated and dissimilar countries as China and Scandinavia, exactly corresponding in both, and apparently peculiar to them.

IV.

In Herr von Werne's adventurous voyage up the White Nile, the furthest region he attained was the country of the Bori in 4° North latitude; he describes it as inhabited by "an exceedingly numerous nation of tall and powerful build, the men six and a half to seven French feet in height, equal to 7 and 7½ English feet,—colossal figures, admirably proportioned and magnificently limbed, black, but with nothing of the usual Negro character in their

features." Rumours of this giant race have floated down from the remotest times. They are the famous Ethiopians most blameless of mortals, whose banquets, as Homer reports, were graced by the presence of the Olympian gods themselves, and who five centuries after were spoken of by Herodotus as " the tallest and most beautiful of the human race." They were the " mighty men," and " Sabæans, men of stature" of the Hebrew prophets, and it was their king Zerah who marched against Solomon's great-grandson Asa with a thousand thousand men and three hundred chariots.* Later still Agatharchides, and after him Diodorus Siculus, speak of them under the same appellation as that used by the German explorer of the present day, namely, the Megabari—so unchangeable are primitive names. Scripture and ancient authors abound with testimonies to the power, civilization, and commerce of the Ethiopians who founded Meroë, and dwelt in the countries about the upper streams of the Nile, and who, as Egyptian arts and civilization certainly *descended* the Nile-valley, may perhaps have been the progenitors of the wonderful monarchy of the Pharaohs. The origin of this people which in the remotest ages developed arts and commerce in the heart of Africa, whither we are only now beginning to penetrate, has awakened much speculation, and India has been pointed to as their probable cradle. Heeren favours the theory of their Indian origin, and there are a few incidental testimonies to it, which, though not conclusive, may be brought forward in the absence of more weighty proof, and have also been not generally noticed. In the life of that problematical character Apollonius Tyanæus, a book of little authority or value, except as a repertory of travellers' stories and legends current in antiquity, the philosopher, after reaching India, and when conversing with the Brahmans, is told the following story by Jarchas, their chief. " There was a time when the Ethiopians inhabited those regions, for in truth they are an Indian race, but Ethiopia was then unknown. Egypt then commenced at Meroë and the Cataracts and terminated at the mouths of the Nile. At that time the Ethiopians dwelt in these countries under the rule of king Ganges ; the earth was fruitful, and they were in favour with the gods. But they mur-

* II. Chronicles xiv. 9.

dered the aforesaid king, after which they were held impure by the other Indians, and the earth refused to let them abide longer in these regions, for she destroyed all seeds that were sown, refused nourishment to the flocks and cattle, caused abortions, and if a town was commenced, she sank and overthrew the houses. Moreover the shade of Ganges followed them whithersoever they went, driving them in terror, and they were not freed from this curse till they had buried his murderers alive. Now Ganges was ten cubits tall, and the goodliest man ever seen, and the son of the river Ganges. Wherefore as his father would sometimes inundate India, he turned his course towards the Red Sea and caused him to become propitious to the land of India. Hence the earth returned him abundance when he was alive but avenged his murder. He built 60 cities, the most splendid in the country, and also drove back the Scythians, who had marched an army over the Caucasus into these regions ; and he buried seven adamantine swords in the ground to the end that no danger or panic should ever invade this country." This seems a very Indian legend ; its very indistinctness smacks of a Hindu origin. Some great religious feud and consequent emigration* may be veiled by it. The great stature of Ganges should not be lost sight of in connection with the national tallness of the Ethiopians, ancient and modern : the legend also contains one of the few direct allusions to a Scythian invasion of India. Again

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* The Puranas have a tradition of the migration of Charma or Ham, with his family and followers, driven from his country by the curse of Noah ; that having quitted their own land they arrived after a toilsome journey on the banks of the Nile. Where by command of the goddess Padma Devi, Charma and his associates erected a pyramid in her honour. There is another migration spoken of in the Puranas, the result of a general war between the worshippers of Vishnu and Iswara, under which names water and fire were respectively typified (in Ireland Osar—Ishwara was the god who kindles fire). This is said to have commenced in India in the earliest ages, and thence to have spread over the whole world. In this struggle the Yoinjees—Earth-born—were worsted and by the direct interposition of the deity whose worship they opposed, were compelled to quit the country. These also took refuge in Egypt carrying with them the ground-work of the Egyptian scheme of mythology."—*Fraser's Magazine*, No. 237, p. 323.

The Arabs themselves call their numerals "*hindi*"—Indian. The story of the Sepoys, who prostrated themselves at the sight of the gods of Egypt, is well known. This cobra de capello with expanded hood, peculiar to India. abounds as a mortuary emblem in the tombs called Bîbân ul Muluk near Thebes, and in the temple at Dendera. "Abi, Assa, Galla, Nil, are African words derived from an Asiatic language." "The Shoan women tattoo their foreheads with a Geez letter ጠ which I am told is an ancient Egyptian symbol of the unity of the deity" Johnson's Travels. Is it not the Hindu trident-shaped Vishnu caste-mark reversed? Sembe is an African and also Indian name of a village at this day.

subsequently in the same book the young man Nilus informs Apollonius that he had heard from his father, who was captain of the ship *which the Egyptians had used to send to India*, "that the Ethiopians were Indian colonists, and retained their forefather's discipline and the memory of their ancient origin." It is noteworthy too that in Syncellus' list of the Egyptian dynasties, the 8th, 9th, 10th and 11th kings of the 18th dynasty are given as a dynasty of the Ethiopian kings *from the river Indus*. The above references show how familiar the idea of a connection between Africa and India was in antiquity, and the general belief that India was the cradle of Ethiopian and Egyptian civilization more recently, especially since the Nineveh discoveries, Assyria seems to be preferred, but as yet without the same balance of probability. Returning for a moment to Apollonius, it is mentioned in his life that he met a man who had been wandering for 7 months amongst the mountains in the country of the Gymnosophists without obtaining absolution for a murder he had committed. The man killed by him was a descendant of the Egyptian Thamus, who had formerly laid waste the country of the Gymnosophists, because they had resisted him in introducing novelties. Can this Thamus be the Tamovatsa spoken of in the Hindu legend, and supposed by Lieutenant Wilford to be the conqueror of the Manethonian King Timaus.

V.

The antiquity of the Eastern salutation salaam is shown by an epitaph of Meleager to be found at page 37 of Brunck's Analecta, Vol. I. The inscription addresses the passer-by, and concludes thus,

> If thou art a Syrian say Selom, but if a Phœnician
> Say Audonis, if a Greek χαιρε.

In the Anthology "selom" is with great probability corrected into salam (σαλαμ), and no doubt allied with the Hebrew selah. "Audonis" is printed (with an asterisk) Naidios, but, like all punic words, is quite uncertain.

VI.

When divine Spenser sings

> "Of God's high praise, and of his sweet love's teen"

the modern reader who frequently finds the last word in the Faëry Queen and in the poetry of that epoch, on referring to the glossery,

discovers that "teen" means grief, sorrow, distress. This word, though unnoticed in Mr. Caldwell's admirable Comparative Dravidian Grammar, is identical with the Tamil தீன் teen, bearing precisely the same signification. The occurrence of the very same word in old English and old Tamil, for in both languages it is archaic, and dropt out of popular use, is something remarkable, as it is not an imitative word, and apparently referable to no common root.

IV. *The Genus Impatiens.—Description of New Species from the Anamallay Hills.* By Lieut. R. H. BEDDOME.

1. *Impatiens parvifolia.*—Herbaceous, sub-erect, branched, glabrous, leaves alternate, minute, cuneate, deeply serrated on the upper half, peduncles axillary, solitary 5-6 times longer than the leaves, with a small bract towards the apex, erect in flower, much reflexed in fruit, upper sepals small and slightly vaulted over the staminal crown, lateral ones small and pointing upwards, lower one boat-shaped without a spur, upper of compound petals, small, lower large spreading (flowers white, upper petals tinged with pink). A very curious species, with very minute leaves, it quite covers large masses of rock towards the summit of the Akka mountain at about 8000 feet elevation.

2. *Impatiens parasitica.*—Stems very succulent, often moniliform, throwing out roots, leaves crowded at the apex of stem, glabrous, long-petioled, ovate, acute, crenate, serrate with incurved bristles; peduncles axillary, short, bearing 2 (rarely 1) very long pedicels; upper sepals with a foliaceous crest, lateral ones linear, acute, lower one saccate with spur-like point; upper of compound petals much smaller than the lower one, both hid in the saccate sepal—capsule glabrous, ovate, gibbous: seeds numerous, small. On trees, from 5000 to 6500 feet; (upper sepals and petals green, saccate sepal dark red,) the flowers vary in size.

3. *Impatiens Tangàchee.*—Herbaceous, sub-procumbent, glabrous, leaves alternate, sub-verticelled, acuminated, deeply ser-

rated; peduncles axillary, 2-3 times longer than leaves, 4-8 flowered towards apex; bracts large boat-shaped: pedicels erect in flower, slightly reflexed in fruit, upper sepals large, lateral ones ovate pointed, spur long tapering, lateral of compound petals, about half the size of the lower ones, with a mucro, capsule smooth, gibbous, seeds numerous, very small (flowers pink.) In beds of streams below the Tangáchee mallay, 5500 feet.

4. *Impatiens elegans.*—Herbaceous, erect, often throwing out roots from the joints, somewhat branched; leaves alternate, on very long petioles, ovate, acuminate, crenate with incurved bristles, above a few rigid hairs on the nerves, beneath pale glabrous, peduncles axillary shorter than petiole, 3 (rarely 4-5) flowered at apex, bracts ovate-lanceolate, acuminated; upper sepals broad, ovate, flat, with a green ridge at their back; lateral ones ovate with a green ridge ending in an acumen; lower one boat-shaped without a spur; upper of compound petals very small incurved and vaulted over the staminal crown, lower ones large spreading; capsule glabrous, seeds hairy—(flowers pale rose with a dark eye) the flowers are much larger at the higher elevations at which the plant grows. Banks of streams 2500 to 4500 feet, a very elegant species.

5. *Impatiens Wightiana.*—Suffruticose, erect, branched; leaves alternate, narrow-lanceolate, acuminate, incurved, bristly serrate, above a few hairs on the nerves, below glabrous; petioles very long, with long pedicelled glands at their apex; peduncles axillary, solitary a little longer than petioles, racemed nearly their whole length; upper sepals with a green ridge at their back, lateral ones small, lower one ventricose with a short incurved spur; upper of compound petal very small, lower ones very long and narrow, pedicels in fruit horizontal, bracts small ovate. Capsule with about 5 seeds, seeds slightly hairy. (Flowers white with the upper sepals and lateral petals speckled with pink.) Banks of the Toracadoo river, 4500 feet.

6. *Impatiens ligulata.*—Erect, herbaceous, much branched, stems glabrous—leaves opposite, linear, lanceolate, mucronate, often slightly cordate at base, remotely bristle toothed, above minute harsh pubescence, below glabrous and glaucous, petioles very

short; peduncles 1-3 axillary, about half the length of the leaves, pubescent on one side, reflexed in fruit; upper sepals small, lateral ones linear, spur curved, gibbous, inner of compound petals? ligulate and completely hid in the spur, lower one large spreading; capsule glabrous, gibbous at centre containing about 12 black shining seeds—(flowers pink, stems red. There is a variety also with white flowers and colorless stems.) Teak forests 2 to 3000 feet, very abundant.

N. B.—This is a very curious species. I do not know whether to consider the long ligulate process which is entirely hid in the spur as one of the petals, or as only an appendage as in *T. viscosa* and *Anamallayensis*, vide fig. 7 and 8; in this species, however, there appears to be only 1 petal, so I am inclined to think that the ligulate process is the inner or lower petal, and the large spreading the lateral one; it has quite an antheriferous look at its apex.

7. *Impatiens viscosa.*—Erect, branched, leaves opposite ovate, long petioled, with a few harsh hairs on the nerves above, pale, and glabrous beneath, incurved bristly serrate; peduncles as long to much longer than the leaves, viscid, bearing 6-12 flowers towards the apex; lateral sepals ovate, lower one with a curved gibbous spur (in form the same as in *ligulata*) lateral of compound petals very small, lower one large; a ligulate process at the conjunction of the petals, which is hid in the lower sepal—capsule ovate, seeds numerous, matted with hair when immature, when ripe echinate. (Flowers small pink.) 3 to 5000 feet, generally only 5 or 6 inches high—in rich soil it is sometimes more than a foot high.

8. *Impatiens Anamallayensis.*—Erect, with sometimes small branches from the axils of the lower leaves, leaves opposite, long petioled, ovate, above a few hairs on the nerves, beneath pale, glabrous; (leaves of the branches alternate) peduncles axillary from nearly as long to much longer than the leaves, bearing 6-8 flowers, towards the apex, on longish pedicels, lateral of the compound petals small, lower one deeply 2 lobed, a claw at the conjunction of the petals, spur very short, straight: capsule ovate, mucronate, glabrous; seeds very hairy. (Flowers small pink.) Streams and moist places, 5 to 7000 feet.

9. *Impatiens verrucosa.*—Root bulbous, leaves radical, ovate to cordate, incurved bristly serrate, above a few hairs, below glabrous: scape 2-3 times longer than the leaves, 5-6 flowered at apex, pedicels long; upper sepals broad, vaulted over the staminal column, lateral ones small ovate; upper of compound petals large and spreading, lower deeply 2 lobed, petals with a batch of warts on their upper surface, spur nearly twice the length of flowers curved, capsule glabrous. (Flowers lilac.) Beds of streams, 7000 feet.

10. *Impatiens crenata.*—Bulbous, leaves radical, short petioled, round cordate very obtusely crenated with a bristle on each crenature, shaggy hairs on the nerves above, beneath glabrous, scape much longer than leaves, 2-3 flowered at apex, pedicels short, bracts ovate-oblong; lateral sepals small ovate, upper sepal vaulted over staminal column, margin crenated, lower sepal with a short obtuse spur, lower of compound petals deeply 2 lobed, a dense tuft of hairs on the inner surface of the petals; capsule glabrous, tapering at both ends. (Flowers white with the tuft of hairs blue.) On rocks 5000 feet—nearly allied to the next species but I think quite distinct.

11. *Impatiens Akka.*—Bulbous, leaves radical, orbicular-reniform, with cordate base, distinctly crenated, petioles longer than the leaves, scapes very long, 5-6 flowered at apex, bracts boat-shaped, lateral sepals small ovate, upper ones vaulted over the stamina, lateral of compound petals large spreading, lower deeply 2 lobed, hairy on their inner surface; lower sepal boat-shaped with a small knot-like spur, capsule oblong shining. (Flowers pure white, large.) Very abundant on rocks on the Akka mountains, 7 to 8000 feet.

12. *Impatiens tenuis.*—Bulbous, leaves radical, long petioled cordate-ovate, with lobes at the base very deep, bluntly crenated, long weak hairs on the nerves above, pale and glabrous beneath, scapes much longer than the leaves, 5-6 flowered, bracts ovate; upper sepals vaulted over the stamina; petals hairy on their inner surface, lower one deeply 2 lobed; spur short blunt and slightly bent back; capsule glabrous. (Flowers small, pink.) On rocks below falls, and in dark corners; rare, 5 to 7000 feet.

13. *Impatiens gracilis.*—Bulbous, with numerous shoots bear-

ing minute leaves; leaves radical, oval to suborbicular with cordate base, 7 nerved, glabrous; pale beneath, with very small bristly serratures, petioles very long, scape much longer than leaves, flowers numerous, long pedicelled; bracts ovate, acuminated; upper sepals vaulted over the stamina, lateral ones small; lower of compound petals broad cuneate, larger than the lateral one, entire; spur curved tapering, nearly twice the length of the flower. (Flowers large, pale lilac.) In streams, 5000 feet. This is the only one that I have met with radical leaves and an entire lower petal.

Synopsis of the Peninsular species of the Genus Impatiens.

LEAVES ALTERNATE.	LOCALITIES.
Peduncles axillary, 1 flowered.	
Lower sepal spurless.	
Pedicels and sepals covered with rusty pubescence .... *I. scabriuscula.*	
Sepals glabrous, flowers minute. *I. pendula.*	
Leaves minute, peduncles very long.................... *I. parvifolia* ..	Anamallay Hills, 8000 feet.
Lower sepal spurred.	
Suffruticose.	
Lateral sepals and spur very hairy, upper of compound petals the largest.......... *I. Munronii* ..	Neilgherry Hills, (Sisparah.)
Lobes of compound petals overlapping each other, upper sepals emarginate at their conjunction.............. *I. albida*	Courtallum, Pulney and Anamallay Hills, 4500 feet.
Petioles bearing hooked glands, upper sepals larger than petals .... *I. floribunda* .	Shevagherry Hills.
Herbaceous.	
Spur hairy, double the length of petals .... *I. dasysperma* .	Pulney Hills, Anamallay, Courtallum 3 to 4000 ft.

Upper sepals and capsule tomentose ....*I. Balsamina*..Plains Malabar, Anamallay, &c.

Lower of compound petals narrow cuspidate..........*I. cuspidata*..Neilgherries, Kotagherry.

Spur straight, shorter than flowers, capsule pubescent..*I. Mysorensis*..Mysore.

Peduncles very short bearing 2 (rarely 1) long pedicels.

Lateral sepals, large pendulous....... ....*I. auriculata*...Courtallum on trees.

Lateral sepals small.

Upper of compound petals concealed under sepal......*I. viridiflora*...

Compound petals both concealed in saccate sepal ....*I. parasitica*..Anamallay on trees, 5 to 6000 feet.

Peduncles bearing several pedicels towards apex.

Herbaceous.

Peduncles viscid.

Spur long, tapering, flowers large..... ....*I. viscida*....Pulney Hills, 7000 feet.

Spur short, flowers small....*I. Gonghii*...Neilgherries (Pycarah.)

Peduncles not viscid.

Spur ventricose, hooked ....*I. uncinata*...Courtallum.

Spur small, incurved........*I. campanulata*.Pulneys and Anamallay, 4 to 7000 feet.

Spur long tapering, upper of compd. petals with a mucro.*I. Tangàchee*..Anamallay, 5500 feet.

Upper of compound petals very small incurved and vaulted over staminal column.

Spur longer than petals, incurved...... ....*I. cordata*....Shevagherry Hills.

Spur none..... ....*I. elegans*....Anamallay, 2500 to 4500 feet.

Suffruticose.
Spur very long tapering, conical, flowers very large ....*I. grandis*....Courtallum, Shevagherries 4000 ft.
Spur longer than flowers, lower of compound petals pointed downwards........*I. fruticosa*...Neilgherries (Coonoor.)
Parasitic on trees or on rocks, lower sepal saccate with spur like point................*I. Jerdoniæ*...Neilgherries (Sisparah ghat.)

Peduncles racemed nearly their whole length.
Upper sepals shorter than the lateral ones, spur long tapering..... ....*I. maculata*...Anamallay 4500, Neilgherries.
Upper sepals much larger than the lateral ones, spur with swollen point ....*I. phœnicea* . Pulnies 7000 feet.
Lower petal narrow and very long, spur very small ......*I. Wightiana*..Anamallay 4500 ft.

LEAVES OPPOSITE.

Peduncles axillary 1 flowered.
Lower sepal without a spur.
Pedicels pubescent, gibbous sepal glabrous............*I. inconspicua* .Neilgherries (Ootacamund.
Pedicels and saccate sepal villous, flowers large ....*I. rufescens* ..Neilgherries (Ootacamund.
Pedicels and saccate sepal glabrous, flowers minute......*I. filiformis*...Anamallay 3 to 8000 feet.

Lower sepal cucullate with spur like point.
Flowers very transparent, pedicels not ½ length of leaves.*I. oppositifolia*.Anamallay 3500 to to 5000 ft. Paulghat jungles.

Flowers not transparent, pedicels the length of leaves . .	*I. tomentosa* . .	Pulneys and Anamallay 5 to 7000 feet, Neilgherries, Mysore.
Lower sepal furnished with a proper spur.		
Upper sepals minute green and hairy, 2 large glands at base of leaves, spur long.	*I. Kleinii*	Anamallay 3000 ft. Malabar plains.
Upper sepals minute, spur not longer than flower	*I. diversifolia*. .	Malabar.
Sepals with callous points, upper petal very small, flowers large.	*I. fasciculata*. .	Pulneys and Anamallay 5500 to 7000, Neilgherries, Malabar.
Lateral sepals long linear acute spur very short.	*I. rosmarinifolia*.	Courtallum.
Inner of compound petals ligulate and hid in the spur . .	*I. ligulata*.	Anamallay 3000 ft.
Spur straight, conical shorter than flower, fructiferous pedicels horizontal	*I. tenella*.	Anamallay 3000 ft.
Suffruticose leaves often subalternate, spur length of flower.	*I. latifolia*	Neilgherries.
Posterior lobe of petals minute, spur longer than flower.	*I. Rheedii*. . . .	
Peduncles bearing several flowers		
Peduncles viscid, flowers small.		
Spur gibbous, upper petal very small, lower one large, a ligulate process at their con-		

junction which is hid in the spur	*I. viscosa*	Anamallay 3500 to 5000 feet.
Spur not gibbous, bracts gland tipped	*I. Pulneyensis*.	Pulneys 8000 feet.
Peduncles not viscid, flowers small.		
Lower of compound petals 2 lobed......	*I. Anamallayensis.*	Anamallay 5000 to 8000 feet.
LEAVES VERTICELLED.		
Peduncles axillary, 1 flowered, leaves 3 in a whorl	*I. Gardneriana*.	Neilgherries (Sisparah ghat 4000 ft.)
Peduncles with several flowers, leaves 4-6 in a whorl ..	*I. verticellata*..	Anamallay & Shevagherries 3 to 4000 feet.
LEAVES RADICAL.—Inflorescence a scape.		
Lower of compound petals, 2 lobed.		
Spur long curved.		
Spur twice length of petals, petals smooth....	*I. rivalis*.....	Anamallay 3000 ft. Courtallum.
Spur longer than petals, petals with warts on upper surface.	*I. verrucosa* ..	Anamallay 5 to 7000 feet.
SPUR SHORT.		
Petals hairy on their inner surface.		
Upper sepals crenated, flowers rather large..............	*I. crenata*	Anamallay 5000 ft.
Upper sepals entire, flowers large......	*I. Akka*.....	Anamallay 7000—8000 feet.

Upper sepals entire, flowers very small..............	*I. tenuis*......	Anamallay 5 to 7000 feet.
Petals not hairy.		
Leaves glabrous; cordate, lobes overlapping..............	*I. scapiflora*..	Neilgherries 7 to 8000 feet.
Leaves hairy above cordate...	*I. modesta*....	Neilgherries (Pycarah) Shevagherries.
Lower of compound petals entire.		
Spur long incurved twice the length of petals..........	*I. gracilis*....	Anamallay 5000 ft.

NOTE.—The Diagrams representing flowers dissected will appear in the next number.—ED. MAD. JOUR.

V. *Numismatic Gleanings. By* WALTER ELLIOT, *Madras Civil Service.*

No. 2.

THE next description of coin to be noticed, is of a very remarkable character and has been found only in one locality.

On the north bank of the Rushikuliya river, in the province of Ganjam, about four miles to the west of Purushòttapúr, the kasba town of the Pubakonda talúk, and close to the modern village of Pândya are the remains of an extensive but now deserted town, surrounded by the debris of a lofty wall. The spot is indicated in sheet 107 of the Indian Atlas by a quadrangular dotted outline, representing a square fortification with a bastion at each angle. This in fact, is very much the appearance of the place. The remains of the rampart can be traced continuously round the whole enceinte, forming nearly a perfect square with a gateway in the centre of each face. The grassy mounds indicating the line of the ramparts, are now covered in many places with jungle, but in others are quite clear. About the middle of the enclosure rises a group of granite rocks, on the face of one of which, at a consi-

derable height from the ground, are two smoothed tablets, filled with inscriptions in the characters of the Allahbad and other similar columns.* They will proably be found to contain another and hitherto unnoticed copy of Asokas edicts,† corresponding apparently with those at Girnâr in Kàt'hiyawàr, at Dhauli in Cuttack and at Kapardagiri beyond the Indus.‡ The placc is now known by the name of Jògad'h, signifying in the Uyra dialect "Lac-fort," a circumstance which has given rise to a local tradition, that the lofty walls formed of that material were impregnable, until the secret of their construction was betrayed by a milk-maid which enabled the besiegers, by the application of fire, to effect an entrance.

In the neighbourhood of this place numbers of copper coins are found, of a type different from any other hitherto met with in Southern India, but presenting a striking resemblance to those of the Indo-Scythian group, more especially to the coins of Kanerki.§ All are much worn, but the following wood cut represents one of the most perfect.

The figure on the obverse and reverse is the same, but in the cut, the position of the arms has been reversed, the right hand being represented down, and the left up, whereas it is the right which should be raised, and the left down.

No traces of Scythian domination have hitherto been met with so far to the south, but it is hardly possible to look at the design in the above figure and not to identify it with those im-

* Jour. As. Soc. Beng. III. pp. 114—483.

† Of these the most celebrated is that of the Allahbad column, first deciphered by James Prinsep, who found it to be identical with those on the pillar called Firoz Shah's *lat'h* at Delhi and on the columns at Bettiah, Rad'hia, &c., in North Behar. The rock inscriptions at Girnar, &c., subsequently deciphered, also proved to be repetitions of another set of edicts by the same monarch.

‡ J. A. S. B. VII. 156, 219, 434.

§ Wilson Ariana Antiqua, pp. 365, 368. Pls. XI, XII.

pressed on the money of that race. James Prinsep has ingeniously traced the gradual transitions of Indian money from Greek models, through the ruder mintage of the Indo-Scythian dynasties, to the purely Hindu coinage of the Gupta kings. Throughout this series, an Indian character is unmistakeably impressed on the progressive adaptations of the mixed Indo-Scythic designs to a pure Hindu type. But no such features can be detected in the Jògad'h coins. On the contrary they have all the appearance of being degraded repetitions of the original Tartar figure, without symbol or legend or other adjunct.

Occasional notices in the writings of Greek and Chinese authors, supported by the numismatic researches of Prinsep, Lassen, Wilson, Cunningham and others, have made us acquainted with the facts of two great invasions of the countries bordering the Indus, by people of Scythian race, about the period of the Christian æra.*

The first was that of the *'Sakas* or *Sacæ*, one branch of whom under Kadaphes, overthrew the Græco-Bactrian power in Affghanistan and other parties extending their possessions towards the south, occupied Scinde and the countries of the lower Indus, under Mayes and his successors, Azes and Azilisus. Encouraged by these successes, they appear to have meditated the conquest of all India, but their progress was checked by Vikramàditya, the Hindu King of Malwa, who gave them a signal overthrow B. C. 56, and assuming the title of *'Sakàri*, established the æra which still bears his name. About the same time, a second influx of a horde called by the Chinese authorities (to whom we are indebted for almost all that is known of their origin,) *Yu-chi* or *Yu-ti*, driven from their original seats in Tartary, poured into the countries south of the Paropamisus, and took possession of the whole country, from Herat to the Bay of Bengal. The coins of Kadphises called Kadphises Koranos, to distinguish him from Kadaphes the first conqueror of Cabul and those of Kanerki his successor, have been found throughout the whole of upper India. Their occurrence is not unknown even in the south, two or three

* Lassen in J. A. S. B. IX. pp. 667, 742, 755, 769, 765. Wilson Ar. Ant p. 302. Cunningham, Bhilsa topes, ch. XI.

specimens in copper having been obtained from Masulipatam and one from Tanjore.

According to Chinese authorities, the *Yuchi* (who appear to be the same as the people called *Tochari* by the Greeks,) retained their hold on India, certainly till A. D. 222* and probably for some time longer. But their power appears to have been then on the wane. There is nothing improbable therefore in the circumstance of some adventurer having penetrated either through Gondwàna or Cuttack to the site of Jògaḍ'h and there having established a petty principality, such as is indicated by the coins under notice. The secluded nature of the country, cut off from intercourse with the interior by the pestilential jungles of Khondistan, the Kôlhàna and Gondwana, is particularly favorable to the continued existence of a small independent state, which in such a situation might long have eluded the observation and cupidity of more powerful neighbours.

Whether the grounds slender as they are, on which a Scythian origin is attributed to these coins, be sufficient, it is for others to say. Should they fail to be accepted, I am unable to indicate any other class of Indian money to which they can be assigned.

The Boar Type.

Among the objects employed as distinguishing symbols on the coins of the south, by far the most celebrated is that of the Boar. Originally the badge of the Chàḷukya families of Kalyàṇ and Ràjahmahéndri, it passed from them to the later Chólas, was subsequently adopted by the Ràyar dynasty of Bijanaġar, and is still found on the seals of some of the petty local chiefs in the Carnatic. Previous to the arrival of the first Chàlukya in the Dak'han, the Pallavas were the dominant race. In the reign of Trilochana Pallava an invading army headed by Jaya Sinha, surnamed Vijayàditya of the Chàlukya-kula, crossed the Nerbudda, but failed to secure a permanent footing. Jaya Sinha seems to have lost his life in the attempt, for his queen then pregnant, is described as flying after his death, and taking refuge with a Brahmin called Vishnu Sómayàji, in whose house she gave birth to a son named

* J. A. S. B. VI. p. 63.

Ràja Sinha, who subsequently assumed the titles of Rana-ràga and Vishnu Vard'hana. On attaining to man's estate, he renewed the contest with the Pallavas, in which he was finally successful, cementing his power by a marriage with a princess of that race, and transmitting the kingdom thus founded, to his posterity. His son and successor was named Pulakési, and his son was Vijayàditya II. A copper *'sásanam* recording a grant made by Pulakési which bears date S. S. 411 or A. D. 489, is extant in the British Museum. The next prince was Kirtti Varma who left two sons, the elder of whom Satyà'sraya succeeded him in the kingdom of Kuntala désa, the capital of which was Kalyàn, a city still existing under the same name, about 100 miles west and a little north of Hydrabad, while the younger, Kubja Vishnu Vard'hana or Vishnu Vardhana the Little,* established a new seat for himself in Telingana by the conquest of Vengipuram, the capital of the Vengi désam, which comprised the districts between the Godavery and the Kistna below the ghats. This event appears to have taken place about the end of the sixth or beginning of the seventh century.

The two families ruled over the whole of the table-land between the Nerbudda and the Krishna, together with the coast of the Bay of Bengal from Ganjam to Nellore, for about five centuries.† The power of the Kalyàn dynasty was subverted for a time in the end of the 9th or beginning of the 10th century, and the emigrant prince or his son, succeeded by marriage in A. D. 931 to the throne of Anhalwàra Pattan in Guzerat, which his descendants occupied with great glory till A. D. 1145.‡ But in A. D. 973 the dynasty of Kalyàn was restored in the person of Tailapa Déva and ruled with greater splendour than before till its extinction in A. D. 1189 by Bijjala Déva, the founder of the Kalab'huriya dynasty.§

The junior branch extended their territories northwards from Vengi to the frontiers of Cuttack, and ultimately fixed their capi-

* The word *Kubja* properly signifies "crooked" or "hunch-backed."

† Dating from the first conquest of Ràja Sinha the whole period would be seven centuries, but there is some chronological obscurity about the earlier princes of the series which we hope to clear up hereafter.

‡ Tod Ann. Rajasthan, where the Anhalwara family is styled both Sòlanki and Chàlukya, pp. 80 and 97.

§ Jour. R. As. Soc. IV. p. 17; and Mad. Jour. Lit. and Sc. VII. p. 209.

tal at Ràjamahéndri the modern Rajahmundry. More than one revolution appears to have occurred in the course of their history, but the old family always contrived to regain its power, until the kingdom passed by marriage to Ràjéndra Chóla the then dominant sovereign of southern India, in whose person the power of the Chólas had reached its zenith. Whether the acquisition of Telingana was due entirely to inheritance or to the joint influence of force cemented by matrimonial alliance, is not clear. The fact however, is certain, that the Chóla power was established in the eastern Chàlukya territories for upwards of a century and a half, and has left permanent traces of its existence. Ràjéndra Chóla was succeeded by his son Vikrama Déva surnamed Kulòttunga Chóla. On the death of his uncle Vijayàditya who had been viceroy of Vengi-désam, the king deputed his son Ràja Ràja to assume the office, but after holding it for one year, A. D. 1078, he resigned it in favor of his younger brother Vìra Déva Chóla, who assumed the title of Kulòttunga Chóla. His grants are found in great numbers from A. D. 1079 up to the year 1135 when a partial restoration of the Chàlukya line appears to have taken place, and they maintained a divided and feeble influence till the latter part of the 12th century when the country fell under the sway of the Kakatiya dynasty of Warangal.*

To assist future enquiries in assigning the coins of the Chálukya race to their proper authors, a list of the sovereigns of both branches is subjoined.

1. Jàya Sinha, Vijayàditya.
2. Ràja Sinha, Rana Ràga, Vishnu Vard'hana.
3. Vijayàditya II.
4. Pulakési, A. D. 489.
5. Kìrtti Varma I.
6. Mangalìsa.

Kirtti Varma I. had two sons of whom the former Satyà'sraya succeeded his father and uncle (who seems for a time to have usurped his rights) as the representative of the Kalyán branch, and from him that line has been called the Satyà'sraya kula, while

* The earliest inscription of the Kakatiyas that has been met in Vengidésan now the Northern Circars, bears date A. D. 1175 ; the latest 1336.

the latter Vishnu Vard'hana the Little *(Kubja)* was the founder of the Rajahmundry dynasty.

WESTERN LINE.

7. Satyà'sraya began to reign A. D. 609.
8. Amara.
9. Aditya.
10. Vikramàditya I.
11. Vinayàditya, Yuddha Malla began to reign A. D. 680.
12. Vijayàditya III. do. A. D. 695.
13. Vikramàditya II. do. A. D. 733.
14. Kìrtti Varma II.
15. Kìrtti Varma III. cousin of the last A. D. 799.
16. Tailapa.
17. Bhìma Ràja.
18. Ayya or Kìrtti Varma IV.
19. Vijayàditya IV.
20. Taila Bhùpa II. or Vikramàditya III. in A. D. 973, restored the monarchy which had been for some time usurped by the Ratta kula. He died A. D. 997.
21. Satyàsraya II. Irivi Bhujànga Déva, A. D. 997.
22. Vikramàditya V. began to reign about A. D. 1008?
23. Jaya Sinha Déva, Jagadéka Malla, about A. D. 1018?
24. Sòméswara Déva I. Treilòkya Malla, 'Ahawa Malla, about A. D. 1040?
25. Sòméswara Déva II. Bhùneka Malla, A. D. 1099, expelled by his brother,
26. Vikramàditya VI. Kàli Vikrama, Tribhùvana Malla, in A. D. 1076.
27. Sòméswara Déva III., Bhùlòka Malla, A. D. 1127.
28. Jagadéka Malla, A. D. 1138.
29. Tailapa Déva III., Treilókya Malla, A. D. 1150.
30. Sòméswara Déva IV., Tribhuvana Malla, A. D. 1182. Dethroned by Bijjala Déva of the Kalab'huriya kula.

EASTERN LINE.

1. Vishnu Vard'hana II. or Kubja Vishnu Vard'hana, conquered Vengi A. D. 605.

2. Jaya Sinha I.
3. Indra Ràja his brother.
4. Vishnu Vard'hana III.
5. Manga Yuva Raja.
6. Jaya Sinha III. } Brothers
7. Kokkili. } Brothers
8. Vishnu Vard'hana IV. } Brothers
9. Vijayàditya I.
10. Vishnu Vard'hana V.
11. Narèndra Mriga Ràja.
12. Vishnu Vard'hana VI. or Kàli Vishnu Vard'hana.
13. Vijayàditya II. or Guna-gunànka Vijayàditya conquered Kalinga.
14. Chàḷukya Bhìma I. his brother.
15. Vijayàditya III. or Kollàbhiganda Vijaya.
16. Amma Ràja,
17. Vijayàditya IV. or Kandagachita Vijaya.
18. Tàḷapa—Usurper.
19. Vikramàditya V. the son of a brother of Amma Raja I.
20. Yudd'ha Malla.*
21. Ràja Bhìma II.
22. Amma Raja II.
23. D'hanàrṇava. Interregnum of 27 years.
24. Kirtti Varma, son of D'hanàrṇava.
25. Vimalàditya, his brother.
26. Ràja Ràja Narèndra.
27. Ràjèndra Chóḷa.
28. Vikrama Déva Kulóttunga Chóḷa.
29. Ràja Ràja Chòḷa, viceroy for one year.
30. Vìra Déva Kulòttunga Chòḷa or Saptama Vishnu Vard'hana. Viceroy from A. D. 1079 to 1135.

The Chàḷukyas were of Lunar race and apparently worshippers of Vishnu. The fact of Ràja Sinha having been educated by

* Some accounts make Yudd'ha Malla the son and successor of Tàḷapa and expelled by Vikramaditya V.

Vishnu Bhaṭṭa Sòmayàji, a Vaishnava Bramin, probably tended to confirm the attachment of the family to this creed. Their style and titles are as follows: Chàḷukya kula; Màṇavyasa gòtra; Hàriti-putra; whose royal power was the gift of Kousika; nourished by the seven mothers; worshipping Swàmi Mahàsêna; having the Boar signet (lánch'hana) the gift of Bhagavàn Naràyaṇa. The insignia of royalty are elsewhere described as consisting of

The white canopy.	'Swêtàtapatra.
The conch shell.	'Sankha.
The noubat.	Pancha mahà-'sabda.
The plough ensign.	Halakêtana.
The drum.	D'hakka.
The Boar signet.	Varàha lànch'hana.
The peacock fan.	Mayùra pinch'ha.
The spear or mace.	Kunta.
The throne.	Sinhàsana.
The royal arch.	Makara-tòraṇam.
The golden sceptre.	Kanaka daṇḍam.

But in the inscriptions recorded when they were at the height of their power, the white canopy, the boar signet, the peacock fan, the royal mace and the golden sceptre only are mentioned. Of these the boar ensign was the most celebrated, and was the symbol invariably represented on their money and on their seals, sometimes in the latter, accompanied by the conch-shell, the drum, the peacock-fan and other insignia not enumerated above, as a lotus, an *ankus* or elephant-goad, candelebra, a seat or stool? the *swastika* cross, &c., and on those of later date—a sword.*

Considering the extent and long duration of their power it is extraordinary that their coins are not more frequently met with. Those represented in plate 1 contain the whole that have fallen in my way, during the twenty-five years that I have been enquiring for them. I have, however, heard of several specimens which have not come under my own eye. A remarkable hoard of gold pieces bearing the effigy of a Boar was discovered many years ago.

* It is not clear whether the sword was ever assumed by the true Chàḷukyas or only adopted by a succeeding dynasty.

in Bellary, the contents of which were presented by Mr. E. B. Glass, the Sub Collector, in whose division they were found to the Revd. Mr. Lowry of the Scottish Church, and by him carried to Scotland. Some others are said to have been taken from a well in the Hatghar zemindarry in Ganjam and coming into the possession of the proprietor, were lost or melted up.

From the practice of stamping the figure of the Boar or *varáha* on the Chàḷukya coins, the coins themselves came to be distinguished as *varáha mudra* or " boar stamped" and the word *varaha* or *varágan* to be the vernacular term universally applied to the characteristic gold coin of Southern India, to which Europeans gave the name of pagoda.

But as a gold coin of the same value was probably in circulation long before the Chàḷukya symbol attained such general celebrity, so the term *varaha* is found to have superseded other names of more ancient date. In Telegu the abbreviated form of expressing this coin in writing is by the letter *g.* (గ) as గ౧ which is invariably read " one varaha" or pagoda. This has doubtless come from *gad'hyánam* a word of Sanscrit origin not in Brown's Dictionary, but of constant occurrence in inscriptions of all ages.

In like manner the Canarese mode of writing the word *varaha* is by the letter *gu* ಗು the first syllable of *gulige* ಗುಳಿಗೆ a small globe or ball (equivalent to the Sans. *gutika*, " pilulus") which was the ancient name of the small spherical coins described in No. 1.

In Tamil, the oldest and apparently the root of all the Dravida dialects, the word *varáha* is now expressed in ordinary writing by the sign உர the first syllable of the word *varágan.*

But this is a modern practice. The word *varaha* never occurs in old writings. To the best of my recollection I have not met with it in any of the numerous ancient Tamil inscriptions which I have collected from all parts of the peninsula.

Whenever a sum of money is mentioned in these ancient records, the denomination in which it is expressed is *pon*, a genuine Tamil word, the normal signification of which is " gold." Even now this word is occasionally used in the sense of a pagoda, in social

ceremonies and time-honored observances, indicative of ancient origin. For instance, the dowry in Tamil marriages is regulated according to fixed scale, with reference to the standing of the several castes, those of highest rank being rated lowest, and the amount of such dower is invariably reckoned by *pons*. Thus the sum appointed for a maiden of Vellazhar race, the first in rank of the Tamulian castes, was formerly 11 and is now 21 *pons*, which in every day usage are represented by 73½ rupees.

In addition to the dowry the bridegroom's parents are required to give another *pon* tied up in a piece of cloth, under the name of *mulei-pál-mudichi* or *mulei-pál-kúli** "the price of the mother's milk," typifying that the expenses of the bride's rearing are thereby discharged, and that she has become thenceforth the purchased property of her husband.

In place of this *pon* it is now the practice to present 3½ rupees wrapped in cloth, to the girl's mother.

The proverbial expression ஆனைகறுத்தும்ஆயிரம்பொன் "though the elephant is black, it is worth 1000 *pons*," conveys the same sense.†

Nor is the evidence confined to colloquial instances. The same use of the word is found in the oldest standard compositions. In the Harischandra purànam when the minister sells his prince to a *Puliya* or out-cast, the price set upon him is 10,000 *pons*..

These examples show that although superseded in modern Tamil by the word *varágan*, the term *pon* was anciently used in the same sense. And this is still more apparent in the southern provinces. In Tanjore the revenue accounts up to a comparatively recent period were kept in *pons*, *panams* and *kásus*, and these terms are still employed in estimating the value of land. But the modern value of the *pon* of account, is only 1 rupee 9 annas. It could never therefore have represented the modern pagoda, the

* முலைப்பால்முடிச்சி or முலைப்பால்க்கூலி, lit. "breast-milk-packet" or "breast-milk-hire."

† The Nàṭṭu Kòṭṭei Chettis a race of mercantile Vellazhas from Tinnevelly, who trade extensively along the whole length of the Coromandel Coast, and the Labbis frequently employ the term *pon* when speaking of pagodas.

oldest specimens of which weigh upwards of 50 grains, and judging from its present nominal value the ancient *pon* could not have weighed more than 20 to 25 grains.

The inference I draw from this fact, is, that the normal standard coin was a piece equal to the modern half pagoda, the pagoda itself being the double *pon*, which ultimately became the *varaha*.

This view is strengthened by the similarity of terms in the Canarese language, in which the following denominations of the present coinage are found:

2 gunjas=1 dugala.
2 dugalas or 4 gunjas=1 chavala or chavile.*
2 chavalas or 8 gunjas=1 d'harana.
2 d'haranas or 16 gunjas=1 honna.
2 honnas or 32 gunjas=1 varaha.

Here the word *honna* is the exact equivalent of *pon*, the *p* in the Hala Kannada dialect being always replaced by *h*, in the modern dialect.

It appears, therefore, that a similar confusion must have taken place, between the *honna* and *varaha* of the Canarese, as has been shown to exist between the *pon* and *varágan* of the Tamils, hence the Mohammedans who first came in contact with the Canarese people in their progress from the north, adopted the word *hún* (ہون) as the Dak'hani term for the standard coin of the country.

The star pagoda is stated by Kelly to weigh grs. 52·56, but on turning to the list of gold coins at p. 39 of Prinsep's Useful Tables, the weights of several of the modern pagodas, will be seen, (excluding those struck at Mohammedan and British mints), to vary from grs. 50 to 52·8. Examples of the older Hindu pagodas now extant exhibit a still greater degree of variation. This may proceed either from the rudeness of the process pursued in the earlier mints,—or from the carelessness of the workmen and their indifference to accuracy,—or it may be due to changes or depreciation of the standard, arising from the caprice or the necessities of the sovereign.

* The same terms are also found in Telugu, with the exception of *honna* which is replaced by *máda*. *Chavala* is also sometimes written *chavile*.—*Br. Dict.* 319-20.

The average weight of twelve of the oldest specimens of the *varaha* and its prototypes in my cabinet, and ranging from grs. 53·27 to grs. 66·9, is grs. 58·05. Discarding the fraction, the weight of the *pun*, *honna*, or *pratápa* as it is also called and *máda*, the equivalent term in Telugu, would then be grs. 29.

The *d'hárana*..........................	14.5*
chavala..........................	7·25
dugala..........................	3·625·
béda (which is the Telugu name of the coin representing the *gunja* or *rati*)..........	1·8125

These results tally approximately with some of the smaller specimens in my collection. Two small pieces from Tanjore, belonging to the Chòla series, to be described in No. III., which I suppose to be *chavalas*, weigh grs. 7·6 and 7·65 respectively, and a third struck by a Pandyan prince, grs. 7·225. Two still smaller and therefore assumed to be *dugalas*, also from Tanjore and apparently belonging likewise to the Chòla series, weigh grs. 3·525 and 3·45. But on the other hand the gold fanams described in No. I.† though of equal or perhaps higher antiquity, do not exceed grs. 6·8 and some are as low as grs. 5·45, and the smaller ones grs. 3, whilst those figured in Pl. 1 with the present No. are a trifle short of 7 grs.

There is no doubt that the earliest coins were merely representatives of pre-existing weights in use at the time when a stamped currency was introduced. The foundation of most of these systems was the *gunja* or *raktika* or more commonly *rati*, the seed of a plant‡ growing in every part of India. It is still in general use among native goldsmiths and varies considerably in size and weight. The discrepancies in the weights of the early coins that have come down to us may be owing, in some de-

* This it will be observed is nearly the weight of the mâsha which, derived from a seed of *Phaseolus radiatus*, serves as one of the *units* of Indian metrology. Jervis (1829) followed by Prinsep (1834) assumes the goldsmiths or bullion *másh* to be grs. 15·5 and from it deduces the proportions of all the other denominations of the system, according to which the *gunja* or *rati* will be grs. 1 9375, the *chavile* 7·75 and the *varaha* 62. Jervis, weights of Konkan, p. 40; Pr. U. T. p. 17.

† Vol III. p. 236-7.

‡ *Abrus precatorius.*

gree to this cause. For it is notorious that goldsmiths use one set of seeds for buying and another for selling,* and it is quite possible that mint-masters may have availed themselves of a similar license in receiving bullion and issuing coin.

An examination of the old system of weights prevalent in Southern India will probably throw more light on this part of the subject, to which it is proposed to return in a subsequent No.

Description of Plate I.

Figs. 1, 2, are of gold and belong to the same class as those described in the former No. figs. 28 to 35, the symbols consisting of a normal figure in the centre, around which four or five others have been afterwards struck by means of smaller dies or punches.

Fig. 1. Cup-shaped, with the reverse plain; obverse on the concave side, with a rude figure of a boar for the normal or central figure, around which are four circular stamps of the *chakra* or wheel. Between these, immediately in front, and in rear of the boar, two stamps of what has been supposed to be intended for the character శ్రీ, *sri* and above and below the boar two square stamps containing letters of which the letter జ *j* only is well defined. The piece weighs grains 55·75.

Fig. 2. is also cup-shaped. The obverse has in the centre a boar much better defined than in the preceding specimen and the design altogether exhibits a superior degree of execution. Above the principal figure are separate stamps of a *padma* or lotus and a *'sankh* shell, below is a bow and before and behind the *'sri*-like symbol. Reverse, a few lines at right angles to each other, forming an irrgular square. Weight grains 58·65.

Both of these were procured from Kurnool. They exhibit a direct transition from the earlier Buddhist coins to those of the first Chálukya princes, and may be considered as examples of the earliest money struck by that dynasty. These two are the only specimens I have ever met with, but in 1846, Capt. Latter, in a paper on the symbolical coins of Arracan, in the Calcutta Journal, described a third, which he states to have been found on the sea-shore

* Jervis' weights of Konkan, p. 39.

in the island of Ramree. "The central portion" he observes, "represents an animal like a pig, with the representation of the sacred Bo-tree above and a monographic character ꣵ beneath, and around, certain characters, &c."* The coin so characterized is doubtless an early Chálukya *gad'hyánam* and its presence in Ramree is easily accounted for by the commercial intercourse which has at all times subsisted between the coast of Kalinga, long under Chálukya domination, and the opposite country of Arracan. Judging from Capt. Latter's figure which is rudely depicted, the central figure is clearly that of a boar, surmounted by a *ch'hatra* or umbrella and with a pillar *(stamb'ha)* or candelabrum before it. The monagram is perhaps the *'sank'h* or some other of the symbols represented on the seals in plate II, and round the central figure are seven separate stamps, four and probably all of which, represent letters in the Hala-Kannada *or* old Telugu character.

Figs. 3, 4, and 5 are all gold die-coins, and may therefore be assumed to belong to a later series. The form also is different and more nearly approaches to the common dumpy form of the pagoda in modern times, but they exceed the heaviest of the recent pagodas in weight. They may be assigned to the period between the 7th and 10th centuries, their relative antiquity being in the inverse order to their numbers in the plate.

Fig. 3, is a copy of fig. 13 in plate 104 of Moore's Hindu Pantheon containing representations of coins found in the cabinet of the late Tippoo Sultan; the obverse represents the boar with the sun, moon, a cross probably intended for a sword and some other symbols not recognizable; the reverse has the scroll pattern, characteristic of many of this class of early coins, from which the term *p'húli hún* or flower-pagoda has probably been derived.

Fig. 4. Obverse, a boar caparisoned with jewelled trappings and having three scrolls of foliage above and below; reverse, a radiated *chakra* or wheel; weight grains 58·65. In the collection of the Government Central Museum, for which it was purchased at the Exhibition of 1855, from the objects transmitted by the Bellary Local Committee.

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* Jour. As. Soc., Beng. Vol, xv. p. 240. Pl. iii. fig. 6.

Fig. 5. Obverse, a boar with the sun and moon above ; reverse, a *chakra* or wheel. This is more rudely executed than the last. The symbols on the reverse of both exhibit indications of Buddhist influence.

Figs. 6 to 10, appear to be gold *chavalas* and form part of a considerable hoard which was discovered in a nullah at the village of Revada in Vizagapatam in 1853, accompanied by some of smaller size and by several others with the figures of fish, and of a fish and panther, symbols of the Páṇḍyan princes and of a bull couchant. From this, I conclude, that they must have been deposited subsequent to the union of the Cháḷukya with the Chóḷa race when the latter having swallowed up most of its rivals to the north and south, had absorbed both the Páṇḍyan and Cháḷukyan territories, in the 11th century.

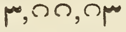
The design on all these is nearly the same ; obverse, a boar over which is an *anku'sa* or elephant-goad ; reverse, the letter with the numerals  or 3, 11, 13, respectively, referring probably to the year of the king's reign in which they were struck. The letter appears to be an old Telugu or Canarese form of *s* and might be supposed to refer to the initial of the reigning sovereign's name, but it is found also on the Páṇḍyan pieces discovered at the same time. The two heaviest weigh grains 6·95. Two very much smaller pieces forming part of the same deposit and weighing grains 1·35 and 1·5 are probably *dugalas.* The smallest has a boar in form exactly resembling the rude outline in the centre of fig. 1. The reverse is indistinct but appears to contain a Nagari letter. The other is a miniature copy in all respects of the *chavalas* above described, with a similar reverse, viz : the character *s* and the numerals 11.

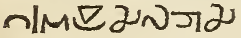
Fig. 11. A copper coin ; obverse, a boar, above which are a sword and the sun : reverse a legend in old Telugu or Canarese characters  in three lines, the upper one of which appears to contain the Telugu figures 15 and the two following ones may be read *'Sriman Ráma.* Weight 57 grains.

Fig. 12 to 17. Five copper coins all of similar design. Obverse, a boar with a sword and the sun and Nagari legends on the reverse. The letters are in horizontal lines on 12, 13, 16, but in vertical lines on 17. Most of these are much worn and very indistinct but the plainest 12 and 13, appear to read *Sàlava* or *Chálava Tiramal Ràya.*

But no such name occurs in the lists, and it cannot refer to the *kula dévata* or household god of the king, for in that case the word *déva* would have been substituted for *ráya.* A king of this name is found in the Bijanagar dynasty between A. D. 1564 and 1572. The princes of this race which as will be shown presently, adopted the boar ensign, always used the Nagari character in their inscriptions and the letters on these coins are of a comparatively modern form. The addition of the sword further favors this supposition. But if this symbol is to be taken as exclusively characteristic of the Ráyars, it will be necessary to assign fig. 11 to them also, which is certainly of greater antiquity and presents other marked discrepancies besides. Their weights are grains 53·275, 43·3, 55·05, 44·95 and 43·8.

Fig. 18. A copper coin much defaced. Obverse, a boar standing in front of a pillar, the rest too indistinct to be clearly made out. Reverse, a legend in Tamil also illegible. This has much the aspect of a Páṇḍyan coin. See fig. 26. Weight, 60 grains.

Figs. 19 and 20 are two copper coins both belonging to the same prince. Obverse of 19, a boar, with an imperfect Tamil legend ; reverse, a rudely represented sitting figure, such as is found on the numerous class of southern coins first brought to notice by Prinsep in his " Ceylon series," and with the Nagari letters under the arm *Sri Rája Rája* ; weight grs. 52·225. The obverse of fig. 20 exhibits also a boar, which is ornamented somewhat in the style of that in fig. 4 and stands on a support like that in the seals in plate II. Reverse, the same sitting figure as in fig. 19, with the name *Rája Ràja* under the arm. This coin is in the collection of Col. Frederick Clerk, late of the 3rd or C. L. I. Regt. They were probably struck by Rája Rája Naréndra the 26th prince in the eastern line, or by his great-grand-son, the 29th, who after his resignation of the vice

royalty of the Telugu portion of his father's kingdom reigned at the seat of the Chóla power in the south, where these coins are chiefly found, Nos. 12 to 21 having all been procured from Tanjore and South Arcot.

Fig. 21. Copper. Obverse, a boar as in fig. 20, with a pillar or lamp in front, an umbrella above, and a scroll underneath. Reverse, the rude standing figure characteristic of the southern or Ceylon type of coins, with four balls and a *'sank'h* shell under the left arm. This reverse, peculiar to the coins of the south, stamps it as belonging to a Chóla-Chálukya prince but to which of them, in the absence of name or characteristic symbol, it is impossible to determine. Weight grains 44·75.

Figs. 22, 23, 24 and 25 are very rude copper coins. All have the boar on the obverse, the first with the addition of a sword. The reverse of 22 is imperfect and appears to be a scroll. That of 23 has a cross round which are drawn two circles. On 24 is a *sinha* or lion, connecting the boar type with that represented in Plate ix of No. 1. The reverse of 25 has some resemblance to the symbol on fig. 1.

They weigh grains 32·25, 25·23, 55 and 33·125.

Figs. 26, 27, 28, 29, 30 and 31, all of copper, constitute a new class pertaining to a dynasty unconnected either with the Chálukya or Chálukya-Chóla families. All have the boar obverse, pertaining to these families, but the legends on the reverse are in Tamil characters.

Fig. 26. Is the most typical and characteristic of the series and supplies data for assigning a place to the others. The obverse has the two fish and crozier of the Pandyán kings and altho' the letters are almost obliterated—on a comparison with others of the same prince, they can be identified as giving the name சுந்தரபாண்டியன் *Sundara Pándiyan* one of the later sovereigns of that dynasty, who appears to have vanquished the Chólas shortly before their final extinction. His grants are extant throughout the whole of the Tamil country. We find several of them occurring at Conjevaram,

and one or two even as far north as Nellore. From these facts, coupled with the discovery of the coins, under consideration, it may be concluded that he assumed the insignia of his vanquished foe and struck coins bearing the dominant symbol of the age.

The remaining three figures represent seals, on rings uniting plates of copper, on which are engraved grants conferred by the earliest princes of the Western Chálukya dynasty.

Fig. 32. Is the seal on a grant of Satyá'sraya the seventh in the list. It bears date S. S. 534 corresponding with A. D., 612.

Fig. 33. Pertains to a grant by Vikramáditya Satyá'sraya or Vikramáditya I. the tenth in the list and the great grandson of the above. The originals of both these grants are in possession of Mahéndra 'Sánti a Jaina Guru at Hyderabad and were sent to me for inspection by General Fraser when resident at the court of the Nizam.

Fig. 33. Is the seal on a grant made by Vinayáditya Satyá's-raya the son of Vikramáditya I, with the date S. S. 613. (A. D. 691.) It belongs to a person in the Kurnool district. I was enabled to copy it through the kindness of the late Capt. New-bold, Asst. Commissioner.

Plate II. The first three figures in plate II. represent seals of the Eastern Chálukyas.

Fig. 1. Represents a seal on a grant, engraved on 4 plates, of certain villages conferred on Brahmins by one Ambod'hi Rája under sanction of Vishnu Vardhana in S. S. 974 or A. D. 1052. The term employed to designate the king is the generic one, which though specially assumed by certain princes of the dynasty, seems to have been more or less common to all and may perhaps refer in this instance to Rája Rája Naréndra, the son of Vimalàditya, and son-in-law of Rajéndra Chòla.

The seal contains in the centre the words '*Srí Tribhuvan anku'sa,* which may be rendered " the auspicious elephant-goad of the three worlds," implying that the owner of the seal controlled the universe as the *ankus* restrains an elephant.

Above the legend is the figure of a boar, with a chank shell and

chàmara in front, and the small drum called *damara* with another *chàmara* behind.

Above these are the sun and moon and a *ch'hatra* which the artist has erroneously represented in the form of a cross or quatre foil.

Below the legend is an expanded lotus and below it a bud on its stalk, a small table to the right, and an *ankus* to the left.

Figs. 2 and 3 are on grants made by Virá Déva Chóla surnamed Kulóttunga Chòla, Tribhuvana Chakravartti and Saptama or seventh Vishnu Vard'hana who was appointed viceroy over the Chálukya dominions by his father Vikrama Chòla and ruled them for nearly sixty years.

Fig. 3 is the earliest in point of date, it records the grant in S. S. 1001* of a village called Kaléru in the Rajahmundry district to a Brahmin named Médam 'Arya, as an endowment for the maintenance of two *mantapams* erected by him at Pithápur and Draksharámam and of a tank constructed at an *agrahàram* called Chellùr. In the centre of the seal, is inscribed in ancient characters the title *'Sri-Tribhuvan anku'sa*, above which is the boar between two lamps and two *chàmaras* or chowries and above these the figure of an *ankus* and the sun and moon. Below the legend is a row of emblems, which appear to represent sacred implements or marks of distinction, conferred by a *guru* or religious preceptor. The first may be intended for the small portable altar called *vedika*, employed in domestic devotion, the next the *lotus* is always esteemed an emblem of sanctity, the third represents the small table for the implements of worship and the fourth the *swastika* or sacred cross, the inscription of which on any person or thing, is held to confer an especial blessing.

As the preceding relates to one of the first acts of liberality of Víra Déva Chòla, so fig. 2 is connected with an act of munificence on the part of one of his servants, towards the close of his rule. In the 'Saka year 1056 Kolani Kátama Náyadu with the permission of the prince, presented the village of Panduva to certain

* This is given in the words *'sasi-khadwa-indu* or the moon (1) two firmaments (00) the moon, (1)=1001.

Brahmins, as an *agrahàram* and for the maintenance of certain temples. The prominent figure on the seal is the boar, with chowries before and behind, a lotus and two candelabra beneath. Above the animal are a *'sank'h*-shell with the words *Sri-Trib'huvan-anku'sa*, surmounted by a figure of the *ankus*, and the moon.

Figs 4 to 8 are seals of the Ráyar dynasty, as it is commonly called, of Bijanagar. This family rose into power on the decadence of the Chólas in the early part of the 14th century and continued in the exercise of sovereignty over a large portion of the Carnatic, for about 400 years. The first capital was Bijanagar (Vijayanagar also sometimes called Vidyanagar) or Anagundi, from which as they declined in power, they removed to Penugonda in the Bellary province and afterwards to Chandragiri in North Arcot. A *soi disant* representative of the family still resides at Anagundi, subsisting on a pension conferred by the British Government.

All the *'sásanams* of the princes of this family, are inscribed in Nagari characters.

Fig 4, is the seal on a grant of the village of Puligarti in Vella-Nellúr of Jayam-konda-Chóla-mandalam, by Bukka Ráya the first of the dynasty, in S. S. 1216 corresponding with A. D. 1294, recorded on three plates of copper. The use of the territorial denominations shows, that the Chóla authority had only just passed away, if indeed it was not still in existence. The execution of the deed is probably anterior to the assumption of independance by its author.

It bears the figure of the boar, evidently derived from the Chálukya-Chólas, standing on a sort of pedestal with the sun and moon above and a sword in front, the latter now first, apparently added to the normal device, as a distinguishing symbol of the new family.

Fig 6, is the seal of Sadá'siva Ráya one of the most destinguished sovereigns of the race. It bears simply the figure of the boar, with the sun and moon, and belongs to a grant on four plates, of the village of Ayyala-nádu in S. S. 1489 or A. D. 1567.

Figs. 5 and 8 are seals of Venkatapati Déva Ráya, the first recording a grant of the village of Nelatùr in the Varoddagiri síma

(now Vridd'há chalam) inscribed on six copper plates, and dated S. S. 1522 or A. D. 1600, the second is incomplete, one of the 5 plates having been lost, but the remaining plates contain the king's name and the date S. S. 1560 or A. D. 1638. The seal bears the name Venkatará(ya) in Nágari characters, an unusual circumstance in the seals of this dynasty.

Fig. 7 is the seal of Ranga Ráya, on a set of plates recording the grant of a village named Kála-kurichi in the Tìrupati Rájyam in S. S. 1566 or A. D. 1644. This is one of the latest of the series, after the family had retired to Chandragiri.*

Fig. 9 is a copy of a picture of his family insignia or arms, sent to me by Raja Kumári Perumál, the zamindar of Karvétinagaram in the Chittoor district, commonly known as the Bomma Raja Poligar. The sword is here depicted above, instead of in front, of the boar, with the sun and moon on either side, the whole on a circular scutcheon perhaps intended to represent a seal, or the round, flat, vertical parasol called *àftàbgìr* carried over persons of rank, by special permission of the sovereign† and usually emblazoned with a family device. Above this, is a shield surmounted by a falcon of the kind called *sàlva* or *bahri* (falco peregrinus) flanked by swords, flags, bows and quivers, and spears.

It appears from a local history of some merit that the ancient possessors of the Nagaram districts were a family of Sálva Reddis, who migrated with their tribe from the neighbourhood of Pit'hapur in the delta of the Godavery, to the country at the base of the Nagari Hills about the 8th or 9th century.

One of them named Sálva Narasá Reddi obtained the favor of the Chálukya king, Vimaláditya, by his skill as an athlete, and was appointed chief of the country of 'Sesáchalam or Tripati (where he founded a town called Narasàpuram) with permission to use the royal seal and boar signet. This was in the year S. S. 852 (A. D. 930). During the troubles which followed Vimaládi-

* Since this paper was sent to press I have been favored with the loan of set of copper plates conveying a grant in the Canarese language of ten villages to a temple in Conjevaram by Krishna Deva Wadiyar Ràja of Mysore in S. S. 1646 or A. D. 1743, the seal in which is a boar exactly resembling fig. 7.

† The vaulted horizontal umbrella was always reserved exclusively for royalty, whence the imperial title *ekach'hatra* and *ch'hatrapati* the origin probably of the word *satrap*.

tya's reign, and ended in establishing the ascendancy of the Cholas, his grandson, S. Venkatapati Naidu, was dispossessed, but his son S. Bhìma Náyadu recovered his patrimony in S. S. 898 and built the town of Ratnapuram, now called Kempala pàlem where he founded a temple to Varáha-swámi in honor of the Chálukya family.*

A successful expedition into the Carnatic by Kirtti Varma, the Chéra king of Malabar about the year S. S. 930, in which the Sâlva chief sided with the invader, enabled his son Narasinha, a man of ability and enterprize, to assume independence, which he maintained successfully for 35 years to S. S. 979 (A. D. 1057). His possessions extended along the base of the mountains, over the breadth of the Carnatic Balaghat from the neighbourhood of Vellore to the sea, including the three sacred places of Ghati-káchalam (Shòlangad), 'Sesáchalam (Tripati) and Kshani-kàchalam (Tiruttani). He surveyed and assessed the whole of the lands within this space, reformed the weights and measures according to the Sálva standard, so called after his own family name and caused them all to be stamped with the figure of the boar. Although his son S. Bhujanga Náyadu was reduced to subjection by the Western Chálukya king, Sòme'swara Déva and was carried away a prisoner to Kalyán where he died, these institutions were preserved and have remained up to the present time.

Bhujanga Náyadu's grandson recovered his paternal estate in S. S. 999 (A. D. 1077). They were again curtailed to 24 villages by Rája Rája Déva Chola II. in S. S. 1152 (A. D. 1230). But during the next four generations, the decaying power of the Chòlas enabled the Sálva family to regain its independence, which was strengthened by the marriage in S. S. 1236, of S. Narasa Náyadu with the daughter of Prolaya Reddi the founder of the Véma Reddi dynasty of Kondavid in Guntoor.

The family now fell under the rule of the rising empire of Bijanagar, to which the Sálvas continued subject for about 150 or 200

* The remains of this temple still exist and among the ruins, the figure of Varaha swami stands exposed to the open air.

years, when the last of the race was expelled or superseded by the progenitors of the present Bomma Rája zamindar. Sàlva 'Sesáchala Reddi, the then head of the family being without heirs, stipulated only that the annual festivals at Náráyanavaram and Tripati should be conducted in the name of the Sàlvas, since which time the new family have assumed the titles of 'Sriman Ràjadhirája—Sàlva-katári-mahá-ràja, &c., and with the insignia of the Sálva family, have maintained undisturbed the rules and institutions established by their predecessors.

The latest mention of the Sálvas that we have met with occurs in a copper 'sàsanam at Tirunnámalei in South Arcot, in which Krishna Ràya of Bijanagar and the Sàlva Nâyaka, having built a *mantapam* of 1000 pillars at Kánchipuram, (Conjeveram) resolve now to erect a similar one at Arunàchalam (or Tirunnàmalei) on a piece of land, purchased from the inhabitants for 500 *pons.* This endowment, witnessed by the inhabitants of all the kòttams and nádus of Tondamandalam, is dated S. S. 1435 or A. D. 1513.

The traditions relative to the prevalence of the Chàlukya influence in this tract, are confirmed by inscriptions extant in the temple of Agastíswara swámi in Nàràyanavaram, the principal town of the district. One of these records a grant to the temple, of the village of Vikrama-tángal alias Chálukya-puram, by Nága-déva of Vélurpákkam, who had received it with others in reward for services rendered to the general of the Chalukya forces in an engagement with the enemy then occupying the Pòtappinàdu (or Kálastri) country. This was made in S. S. 826, in the 11th year of the reign of Kulòttunga Chòla (probably Rájéndra Chola.)

Another inscription in the temple of Pará'sara in the same town, records the gift of the village of Kandyan by one Pallava Ráya who had received it from Nàgadéva the lord of Pótappinàdu in the 13th year of Uttama Chóla or S. S. 1027.

A third in the temple of Agastíswara Swàmi contains a royal grant of certain lands to the temple, in the 6th year of Tribhuvana Malla Dèva with the titles of Sarvaloká'sraya, the ornament of

the Satyà'sraya Kula, conspicuous among the Chàlukyas, &c., in S. S. 1078 corresponding with A. D. 1151.

Fig 10 is an iron weight bearing the stamp of the Sàlva standard, obtained from Nàrayánavaram. It exhibits the figure of the boar and sword with the sun and moon and on the back are the words *Pramadicha sa.* (mvat-sara) *vi.* (sam.) 1, signifying that this weight of 1 vis was stamped in the cycle year. It weighs exactly 3lbs. 1 oz. 4drs.

Fig 11 is an iron measure marked like the preceding and incribed with the words *Pramadicha sa. sardha pa*, which stand for Pramadicha Sa (mvatsara) half pa(di.) The depth is 5·6 inches the diameter at the top 4·2 and at the bottom 3·9 and the weight of the water it held at 81° Fah. was 1 lb. 19 oz.16 drs. 2 grs.$=62\frac{1}{2}$ cubic inches.

Fig 12 is an iron quarter vis of octagon shape with the sword sun and moon engraved upon it, and the year *Pramadicha sa. vi.* / the latter mark indicating one quarter in Telugu notation. Its weight is 12 oz. 2 drachms.

SELECTIONS.

Observation on the Poison of the Upas Antiar. By Professor Albert Kölliker.

During my stay in England, in the autumn of 1857, I was so fortunate as to acquire the rare poison of the famous *Antiaris toxicaria* (Lesch), with which no experiments have been tried since the time of Magendie, Brodie, Horsfield, Schnell and Emmert (1809-1815). I owe my specimens of the Antiar poison to my friend Professor Christison, of Edinburgh, who had it from Borneo, and to Dr. Horsfield, of London, who collected it himself during his stay at Java in the beginning of this century, and as both specimens were fully active, as some preliminary experiments made in company with my friends, Dr. Sharpey and Dr. Allen Thomson showed, I thought it well worth while to devote some time to the study of the poison, and to try to elucidate its manner of action on

the animal organism. The following are the principal results which I obtained in my experiments with frogs, and I hope that they will not be deemed unworthy of notice by those who take an interest in the physiological action of poisons in general.

The Antiar, like most other poisons, acts from the intestinal canal, and from wounds, but it must be remarked, that it is much more energetic and rapid when introduced into a wound. The symptoms which are observed in frogs, in the latter case, are the following. First of all, the voluntary movements become less energetic, and at length cease totally, 30 or 40 minutes after the introduction of the poison (after 21m. min. and 1h. 21m. max.). Then follows a time in which reflex movements may be caused by stimulating the skin, but this faculty also is lost very soon, viz., at from 50 to 60 minutes (at 33m. min and 85m. max.), and the animals die without the slightest trace of convulsions or tetanic spasm. If now the frogs are opened, we find that, without any exception, the heart has ceased to beat. The auricles are dilated, the ventricle corrugated, rather small, and generally red, as if blood had been extravasated into its muscular parietes, but very soon the exposure of the heart to the air causes the ventricle to shrink a little more, and to become pale and stiff, as if in the state of *rigor mortis*. All interior organs, especially the lungs, liver, stomach, intestine, and kidneys, are gorged with blood, and in a state of great, especially venous, hyperœmia. The blood is fluid and rather dark; but soon coagulates when exposed to the air, and assumes a brighter colour. The lymphatic hearts cease to beat as soon as the reflex movements are lost. At the same time the nerves are yet found excitable, but their power is very low, and generally vanishes in the second hour after the application of the poison. The same must be said of the muscles, which contract very feebly when directly stimulated by galvanism, and in most cases lose their power totally in the second or third hour, and generally a little after their nerves. The *rigor mortis* begins early, sometimes in the sixth hour, and is generally well established at the eighteenth hour.

Amongst all these symptoms, to which we may add some signs of vomiting occurring now and then, there was none which attract-

ed my attention, more than the cessation of the movements of the heart, considering the great energy which this organ possesses in frogs, and I tried, therefore, before all, to elucidate the action of the Antiar upon the heart. For this purpose I instituted a new series of experiments, in which I exposed the heart by the section of the sternum, before the poison was introduced into a wound of the back, and in this way I easily got the result, that the heart ceases to beat as soon as from the fifth to the tenth minute after the introduction of the Antiar, and so, that first the ventricle stops, and half a minute or one minute later, also the auricles. Now, as the frogs at this time are not at all deprived of their faculty to move, we may have the rather astonishing view of an animal, with artificially paralysed heart, which moves and leaps as freely as if nothing had happened.

The experiments just mentioned prove, that the first action of the Upas Antiar is to paralyse the heart, and I am therefore quite in accordance with Sir Benjamin Brodie, who, by his experiments on *Mammalia*, came to the same result in 1812, whilst I cannot otherwise than disagree with Schnell (Diss. de Upas Antiar, Tubingæ, 1815), who assumes that this poison acts in the first place on the spinal marrow. Now this point fixed, the further question arises, whether the other symptoms mentioned, viz., the paralysis of the voluntary and reflex movements, and the loss of the irritability of the muscles and nerves are only the results of the paralysis of the heart, or must be attributed to a specific action of the Antiar. For the elucidation of this question, I found it necessary to study the consequences of the suppression of the heart's action on the organism of frogs, which I did in the same way as it had been done by others, especially by Kunde Müller's Archive (1847), viz., by cutting out the heart, or by putting a ligature around the base of it, so as to stop the circulation totally. The results of these experiments were in both cases the same, that is to say, the voluntary movements ceased in from 30 to 60 minutes, and the reflex movements after one or two hours. Hence it follows that these two symptoms of the poisoning with Antiar are simply dependent on the paralysis of the heart caused by it. With refer-

ence to the irritability of the muscles and nerves, on the contrary, it is easy to show that the ligature or excision of the heart has not the same influence as the Antiar, inasmuch, as in the first case the muscles and nerves are found irritable six or seven hours, and more after the experiment has been made. Therefore it may be said that the Antiar has a direct action on these organs.

These points once demonstrated, there remained one more question to elucidate, namely, whether the Antiar acts only upon the muscles, or also upon the nerves. If we consider that the Antiar undoubtedly paralyses the muscles, we may easily see that the loss of the excitability of the nerves possibly depends merely upon the impairment of the muscular contractility, and is therefore not real, but only apparent. With a view to determine the real state of things, I tried a third series of experiments, poisoning frogs in such a manner that the muscles of one limb were kept free from the influence of the poison. This was done in two ways, first, by putting a ligature round the crural artery and vein of one leg, and secondly, by cutting through a leg entirely, after the ligature of its vessels, with the exception only of the ischiatic nerve. In poisoning frogs treated in one of these ways, through a wound of the back, I found that, with the exception of the heart, the Antiar acts in the first instance upon the muscles. This is shown by the fact, that in the second hour, at the time when the muscles of the poisoned parts have lost their irritability, the nerves of the sacral plexus in the abdomen still possess their full influence upon the muscles of the leg which has been kept free from the action of the poison. One might be inclined from this to conclude, that the nerves are not at all acted upon by the Antiar, but this inference would be erroneous. In fact, the experiments just mentioned, if followed a little longer, show that in the third or fourth hour the sacral plexus also becomes inactive, at a time when the muscles of the non-poisoned leg are fully contractile. The Antiar, therefore, paralyses also the nervous trunks, but later than the muscles.

From all the experiments, it seems to follow that the Antiar is a poison which acts principally upon the muscular system (the heart and the voluntary muscles), a conclusion in favour of which

I may further add, that the muscles and the heart of frogs poisoned by Urari (Woorari, Ourari) lose their irritability totally, and in a short time, if Antiar is introduced into a wound some time after the Urari. If we consider that, as I have shown (see Proceedings of the Royal Society, 1856, p. 201,) the Urari only acts upon the terminations of the nerves in the muscles, and does not effect the irritability of the heart and muscles at all, we may conclude, that a poison, which, as the Antiar, is capable of paralyzing the muscles after the Urari, has really a direct action upon the muscular fibre. The results of my investigation into the effects of the Antiar upon frogs, are therefore the following.

1. The Antiar is a paralyzing poison.

2. It acts in the first instance and with great rapidity (in 5 to 10 minutes) upon the heart, and stops its action.

3. The consequences of this paralysis of the heart are the cessation of the voluntary and reflex movements in the first and second hour after the introduction of the poison.

4. The Antiar paralyzes in the second place the voluntary muscles.

5. In the third place it causes the loss of excitability of the great nervous trunks.

6. The heart and muscles of frogs poisoned with Urari may be paralyzed by Antiar.

7. From all this it may be deduced, that the Antiar principally acts upon the muscular fibre and causes paralysis of it.

So much for this time. My experiments with the Antiar upon warm-blooded animals have only begun, and I am not yet able to draw any conclusion from them. As soon as this will be possible I shall take the liberty to submit them to the Royal Society, together with the results of my experiments with the Upas Tieutê, which poison I had also the good fortune to obtain through the kindness of Sir Benjamin Brodie and Dr. Horsfield. With regard to the Antiar I may further add, that experiments made indepen-

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NOTE.—This famous poison consists chiefly according to Schomburgk of the *Strychnos toxifera.*—ED. M. J.

dently, and at the same time, by my friend Dr. Sharpey with this poison, have conduced to the same results as my own. *Proceedings of the Royal Society.*

On the Brine-springs of Cheshire. By AUGUSTUS BEAUCHAMP NORTHCOTE, F. C. S.,* *Senior Assistant in the Royal College of Chemistry.*

THE existence of salt deposits in Cheshire, and of the brine-springs which flow from them, has from the earliest historic periods exercised a very peculiar influence upon the economic features of that county. It appears from the records of Domesday, that salt was even then one of the principal articles of its commerce, and that at a period anterior to the Norman conquest it brought in a considerable revenue to the Crown, for as early as the time o Edward the Confessor, the Wiches, as they were called, are stated to have been very productive, and the tolls levied upon the amount of salt sold were divided in the proportion of two-thirds to the King and one-third to the Earl of Chester. Upon the Conqueror's accession, the earldom was given to Hugh Lupus, his nephew; but the property attached to it had diminished in value; for it is recorded that the salt-works at Middlewich aud Nantwich, which under the Saxon rule had produced a rental of £16 per annum, had fallen into complete disuse; and that those of Nantwich, from which an annual income of £20 had been derived, were almost as much neglected, for out of eight salt-works which had formerly flourished at this latter place, one only was at that time in operation, This period of depression was not, however, of long duration, for shortly afterwards a partial recovery had taken place since the Nantwich salt-works are spoken of as being let to farm by the Crown for £10, the Middlewich at 25s., and the Nantwich at

* Communicated by the Author.

35s. per annum.* It is thought probable that at this period, the chief export of Cheshire salt was to Wales, for the Welsh gave to Nantwich the name of Hellath Wen, or the white salt-pit; much export trade could not have been carried on, for very long after this date, the salt manufacture of Cheshire did not exceed the consumption of the county itself, and a few of its immediately adjoining neighbours.†

It is curious to observe how the importance of places decreases in course of time through the effect of influences, at first apparently but slightly adverse, becoming under somewhat altered circumstances highly detrimental. Nantwich throughout the whole of its early history held the first rank among the salt-producing towns,—there were situated the brine-pits which Henry III. stopped up in order to distress the Welsh by cutting off their supply of that necessary article of food; and when this embargo upon the commercial activity of the town was withdrawn, we find it far surpassing its former self in the energy of its undertakings. This increasing prosperity and wealth continued until it reached a culminating point, from which it has ever since gradually but irretrievably descended. It seems to have attained its summit in the time of Henry VIII., for Leland states that at that time Nantwich contained 300 salt-works: their reduction then began, and in the early part of the reign of Queen Elizabeth their number had decreased to 216, whilst in 1624 they had dwindled nearly to 150. The cause of this declension was want of water-carriage. Nantwich being unfortunately situated beyond that point of the Weaver up to which it was navigable; a more advantageous locality was therefore sought for; the banks of the river were examined, and other springs found in more favoured situations, possessing moreover in addition to superiority of position, the no less important advantage of greater concentration. From the date of that discovery the salt manufacture in Nantwich steadily declined, although the inhabitants still repaired annually on Ascension day to the "Old Biat," their most ancient salt-pit, and adorning it with flow-

* Lyson's *Magna Britannia*, Vol. II, part II, p. 408, (1810).
† *Ibid*, pp. 408, 409.

ers, ribands, and green boughs, they danced round it to their rustic music, and sang a hymn of thanksgiving for the blessing of the brine. This old custom was discontinued about the middle of the last century, for the blessing which they celebrated was fast leaving them. In 1810* one salt-work only existed in the town, and that is now, I am told, done entirely away with and the pit closed. But while Nantwich has been thus descending in the scale, Middlewich and Northwich have been increasing in importance ; and along the lines of water-communication, the rivers Weaver and the Grand Trunk Canal, which runs parallel with the river Wheelock, other places have sprung up from time to time. Of these the most important appear to be, Winsford on the Weaver considerably below Nantwich, Marston and Winnington on the same stream in the immediate neighbourhood of Northwich, and Anderton somewhat nearer the river's mouth ; whilst on the Wheelock, in the vicinity of Sandback, several works of great consequence have been established. A few statistics will show the immense increase which this branch of manufacture has undergone within a comparatively short period. Within the ten years from 1800 to 1810, the amount of salt produced in Northwich is said to have doubled, and the annual average of white or manufactured salt sent down the Weaver from Winsford and Northwich during that period was 139,317 tons ;† this appears to have been the entire amount shipped on the Weaver, and is therefore comparable with the total quantity of white salt‡ (as distinguished from rock salt) which was carried down that river in the year 1832, which amounted to 383,669 tons, and which by the year ending April 5, 1856, had increased to 709,514 tons. With this, other accounts agree ; for Lyson states that in 1805-1806, the total annual produce of the Cheshire brine-pits, those of Nantwich and Frodsham excepted, was 16,590 tons ; whilst at the present time single manufacturers, such as Mr. Blackwell of Wheelock, and Messrs. Ray of Winsford, produce respectively 70,000 tons, and from 50,000 to 60,000 tons of salt per annum.

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* Lyson's *Magna Britannia*, Vol. II., part II., p. 703.
† *Ibid.*
‡ Ure's Dictionary of Arts and Manufactures, 3rd edit., p. 1091.

The salt which is now produced in Cheshire is made, I understand, exclusively from natural brine-springs; but it has formerly at various times been obtained by dissolving rock-salt in water and evaporating the clear solution. The principal varieties manufactured are three: the salt of coarsest grain, or bay-salt; that of the finest grain, to which the name of table-salt is applied; and an intermediate variety, which is called common salt. The latter is made in the largest quantity, and forms the principal part of the vast export of Cheshire. More than three-fourths of the total amount of salt produced is used for foreign consumption; and of the remaining fourth, a considerable portion is employed in the supply of the British fisheries. It has, however, only attained its reputation after a somewhat severe struggle with foreign competitors; for in the year 1810, Mr. Henry* found it necessary to set forth an apology for British salt as an agent in curing provisions in no way inferior to that prepared from sea-water by evaporation on the shores of the Mediterranean, and to deprecate the folly of Great Britain in expending large sums of money in the purchase of an article, which she possessed the means, beyond almost any other country in Europe,—drawing from her most internal resources. Fortunately these remonstrances were not addressed in vain, and this country soon ceased to neglect her native produce, and to import that from abroad which she had in such abundance and of such excellent quality at home.

The great means however, of extending the salt trade in this country, has been the gradual improvement in the mode of raising and evaporating the brine. Originally, in the early days of the manufacture, the method of obtaining salt from the brine by evaporation was unknown; and its preparation consisted only in pouring the brine upon burning branches of oak and hazel, from the ashes of which the deposited salt was afterwards collected. At length, however, the plan of evaporation was devised; but for a long time wood was the only fuel, of which such immense quantities were consumed at the salt-works in Droitwich in the time of Camden, that he represents Feckenham Forest and

* Phil. Trans. Royal Soc., 1810, p. 89.

the neighbouring woods as becoming perceptibly thinner and thinner day by day. This havoc seems to have been continued, notwithstanding, until the middle of the seventeenth century, when the gradual introduction of coal superseded the more primitive kind of fuel.* In the methods adopted in raising the brine, great alteration also has taken place in the lapse of time; at Northwich, in Camden's time, a pit existed which furnished an abundant supply, but the way in which it was brought to the surface was crude in the extreme; the pit was provided with stairs, by means of which men descended with leathern buckets; these they filled with the water, and then ascending emptied their contents into troughs, which served as reservoirs for the wich-houses.† From manual labour they passed to the employment of horses for this purpose; water-power and wind-mills were subsequently used; but all have been superseded of late years by the superior efficiency of the steam-engine. The methods of evaporation have also undergone vast extension and improvement. In early times this process was conducted in small leaden vessels six of which they had in every house at Nantwich, and the salt was removed by women with little wooden rakes, placed in baskets, and drained.‡ These six leaden pans were afterwards exchanged for four iron ones, about 6 inches in depth and of a surface of about a square yard, capable of holding the same contents as the original leaden vessels. The limited extent of the operations thus conducted diminishes our wonder at the great proportion of wick-houses existing at these places during the middle ages, and so far surpassing the number in operation at the present day. Even so recently as a century ago, the largest pans at Northwich were only 20 feet long by 9 or 10 broad; whilst those employed 40 years since had a superficies of 600, 800, and 1000 feet, with a depth of from 16 to 18 inches. The area of the pans has now, I suppose, almost reached its limit; some which I saw at Mr. Blackwell's works at Wheelock having a length of 70 feet and a width of 23 feet, making 1610 feet of surface. The heat is generally applied directly by the flue of from one to three

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* Holland's *General view of the Agriculture of Cheshire, p.* 71.

† Ibid, p. 48.

‡ Ibid, p. 50.

furnaces, placed at one extremity of the pans, but in the works of Messrs. Ray, of Winsford, I found part of the evaporation conducted upon a different principle : a small iron pan, heated by a furnace in the ordinary way, is made to communicate by a narrow channel, with a brick or clay-lined basin ; this again is in connexion with others of the same description disposed around a centre, and lastly, one is arrived at immediately adjoining the first mentioned iron pan ; the brine is here by a very simple kind of pump transferred to the heated iron vessel, by which means the level of the liquid in the brick basins is kept constantly below that in the original starting-place, and thus a continual circulation of the brine is maintained.

In the preparation of salt from brine, various substances have been at different times added, from the idea of improving the quality of the product. Until recent times it was thought, that during the evaporation of an aqueous solution of chloride of sodium, hydrochloric acid was expelled, and soda formed : this doubtless arose from the decomposition of the chloride of magnesium contained in the brine which the experiments were made,—an evolution of acid vapours having been probably observed during the incipient drying of the salt. In order to counteract this supposed evil, acids were added, and it was imagined that the excellence of the Dutch salt was due to a skilful admixture of whey, which the manufacturers were alleged to make with their brine during the evaporation, which prevented the injurious effects of the free alkali. Another very favourite class of adjuncts has always consisted of substances which contain constituents possessed of the property of coagulating upon the application of heat, which clarify a liquid by entangling all suspended particles of solid matter in the meshes of their coagulum, and carry them with it as it rises to the surface. Those substances which contain albuminous or gelatinous matters are peculiarly adapted for this purpose, and are constantly used in a variety of manufactures for the attainment of this end. Blood, white of egg, glue and cows or calves' feet have long been used in this way in salt-making. In 1670 the Nantwich salt-makers are described as mixing twenty gallons of brine with two quarts of blood, and adding about two quarts of

this clarifying liquid to a pan which held 360 quarts of brine. In 1810 this process was still adopted in some of the Cheshire works, but I am not aware that it is ever used at the present day. At Droitwich the use of white of egg seems to have prevailed. Various vegetable infusions, still containing albumen, as linseed, mucilage and ale, were, in the early days of manufacture, in great repute, but have, I believe, now fallen almost entirely into disuse.

In order to prevent that most unpleasant circumstance attendant upon the evaporation of all concentrated saline solutions,—the formation of a pellicle upon the surface of the liquid, which gradually becomes a thick layer of salt, and seriously impedes evaporation—another class of bodies are mixed with the brine; these are oils or butter, which, spreading over the whole area, by a peculiar molecular action prevent the formation of any pellicle, or "setting over" of a pan, as the workmen term it, and preserve that open surface which is most favorable to evaporation. The action of finely-powdered resin in effecting this is perfectly magical, the introduction of a very few grains being quite sufficient instantly to clear the surface of the largest pan, and to prevent any recurrence of the formation of the pellicle. This substance was also formerly thought to perform another function, viz., the production of a salt of finer grain; wheat-flour was also believed to exert the same action, whilst alum was added in order to facilitate the formation of larger crystals; but I believe it is now found that the regulation of the degree of heat employed in the evaporation will influence the size of the crystals with the utmost nicety, and that attention to that circumstance alone is sufficient to produce all the varieties which are found in the market. In Holland's "General view of the Agriculture of Cheshire," to which I am so much indebted, and to which such frequent reference has been made, will be found a list of the varieties produced at different temperatures; according to it, the finest table-salt is deposited from the brine at its boiling temperature (220° F.), and the coarsest description by slow evaporation conducted at from 100° to 110° F.

The derivation of the brine in Cheshire is too well known to require any observation: the immense beds of rock-salt which occur in the new red sandstone of that county are familiar to every

one. The existence of this substance appears to have first evidenced itself by the saline springs which at various places rose to the surface; and the majority of these spontaneous appearances seem to have occurred in the immediate vicinity of the course of the river Weaver, and of the lesser stream, the Wheelock. The former of these rises in the south-west portion of the county, and after running south for some miles, turns at Audlem to the north, passes Nantwich, and after some distance, Winsford; receives the Wheelock about Northwich, and passing Marston and Anderton, proceeds to the Mersey. The Wheelock rises in the south-east part of Cheshire, and passing the village of the same name, flows by Middlewich to its confluence with the Weaver. Along the banks of these streams a continual succession of places occurs which have at various times been famous for the production of salt; and although great fluctuations have taken place, yet these have been due rather to incidental causes than to any failure of material;—imperfections in shafts allowing the admission of fresh-water springs, and a slight distance from the convenience of water-carriage, are reasons quite sufficient for the transfer of the manufacture from one place to another. Causes such as these probably led to the abandonment of the works at Dunham in the north-east of the county, and of those at Droitwich in the south-west; yet the occurrence of brines at these places is interesting, as indicative of the position and extent of the beds of salt below, the two places being about thirty miles apart, and about equidistant from the centre of the district which is now the salt-producing one. This region may be said to lie north-west and south-east, and to be composed of three divisions,—the Northwich, the Middlewich, and the Sandback: the first comprehends Northwich, Marston, and Anderton, besides various other places near them; the second embraces Middlewich and Winsford, with the surrounding neighbourhood; and the third of more limited extent with respect to actual operation includes Sandback, Wheelock, and a few villages in the immediate vicinity. In order to obtain fair samples of the Cheshire brines, I therefore took specimens from each of the above districts. From the Northwich district I obtained two, from springs a few miles apart, through the kindness of Mr. Johnson Fletcher; the places selected in this instance were Anderton and Marston;

proceeding in the south-easterly direction, a specimen was chosen from the active department of Winsford, in the central district, and Messrs. Ray and Son furnished me with the brine which they employed; whilst in the extreme south-east, Mr. Blackwell provided me with samples from the spring which supplies his extensive works at Wheelock.

The depth at which the brine is found, and the level to which it rises, vary very much at different places. It appears that it is generally necessary to sink from thirty to fifty yards, in some cases even to a depth of eighty yards, before the spring is arrived at; the water then rises in the shaft to within from twenty to ten yards of the top, sometimes even to the surface. The general level of the brine in the pits is, however, far below this standard, as its removal by the pumps is so rapid as never to allow it to rise to its full height.

As in the case of Worcestershire brines, I was desirous of ascertaining whether the composition of these springs varied with the different seasons of the year, with this view analyses were made in every instance of separate specimens taken respectively in January and August, and, as I had already found in the case alluded to, no difference worthy of note existed between them.

The analytical methods which have been adopted in the examination of these brines, are precisely those described in the former memoir on the Worcestershire springs; instead, however, of evaporating small portions of the waters to obtain mother-liquors and residues which might contain the rarer constituents, I obtained portions of the liquid which remains in the pans after the removal of the salt, and of the solid cake of earthy matter which adheres so tenaciously to the bottom of the pan as to require separation by the pick, and is called by the workmen "pan-scale." The former of these was tested for potassium, bromine, iodine, and phosphoric acid; and the latter for arsenic, antimony, tin, iron, manganese, aluminum, strontium, and fluorine. The brine itself was also examined for silica, for organic matter and its resultants, ammonia and nitric acid, and the metals precipitable by hydrosulphuric acid. The principal constituents of these waters are

sodium, calcium, magnesium, chlorine and sulphuric acid. Of the bodies occurring in less quantity, a minute trace of potassium was found, a small quantity of iron with a little alumina and considerable traces of manganese, not, however, in proportions capable of determination. Bromine was ascertained to exist in rather large quantity, the unconcentrated brines becoming distinctly yellow upon the passage of a few bubbles of chlorine; this element was, therefore, determined by the method recommended by Fehling,* which depends upon the fact, that if a solution of chloride of sodium containing a small amount of bromide be insufficiently precipitated by nitrate of silver, the precipitate nevertheless contains all the bromine present; the bromine in the mixed precipitate of chloride and bromide of silver is then determined by the passage of chlorine over the fused mass in the usual way. The results yielded by this process, which were carefully and frequently repeated upon very different quantities of brine, agreed among themselves in the closest manner. The existence of iodine was proved in all the waters, but the quantity present was minute in the extreme. In one case also an indication of fluorine was obtained by the apparently etching action exerted upon a watch-glass in the application of the test now usually employed: these markings, however, on the parts uncovered by wax, although quite obvious when the newly-cleaned glass was breathed upon, were perfectly imperceptible when the same watch-glass was taken up a day or two later and re-wiped for the purpose of fresh examination.† Since that experiment, M. Nicklès's observations‡ on the fallacies incidental to this method of testing have appeared; and this doubtless was a case such as he describes, in which the vapour of any acid, or even of water, may exert such an action (not chemical, I presume, but physical), and fix upon glass any design at first traced upon the layer of wax. The search for the remaining substances above mentioned was unsuccessful, and they were therefore presumed to be absent.

* Fresenius, *Quant. Analysis*, p. 345. 2d Eng. edit.

† I accounted for this at first by imagining that a thin film of wax might be impressed by the needle upon the glass, which was not immediately removable by the first cleansing.

‡ *Comptes Rendus*, March 30, 1857, p. 679.

I will now proceed to state the results which the analysis of these brines has afforded me, premising them simply by naming the sources from which they were derived. I. Andertone brine, from the pit of Lord Stanley of Alderley. II. Marston brine, from the works of the executors of the late C. W. Newman, Esq. III. Winsford brine, from the shaft of Messrs. Ray and Son. IV. Whelock brine, from the works of Mr. Blackwell.

	1 Anderton Brine.	2 Marston Brine.	3 Winsford Brine.	4 Wheelock Brine.
Specific gravity of Brine.	1·2048	1·2001	1·2049	1·2013
Reaction of Brine	Feebly Alkaline.	Feebly Alkaline.	Slightly Alkaline.	Feebly Alkaline.
Saline matter contained in a gallon of Brine...	Grains.	Grains.	Grains.	Grains.
Chloride of Sodium	21704·712	21187·234	21528·550	21302·772
Bromide of do.	8·686	9·240	13·326	16·986
Sulphate of Lime	382·885	328·467	379·543	351·500
Carbonate of Soda	19·397	30·242	26·989	....
Carbonate of Lime.....	1 686	....	5·060	43·727
Carbonate of Magnesia.	63·252	89·887	155·191	84·977
Sulphate of Soda......	....	122·650	....	....
Chloride of Magnesium	....	....	....	143·795
	22180·618	21767·720	22108·659	21948·758

Toward the latter part of the autumn of last year, a considerable panic was created by a sudden outcry being raised that the supply of brine was rapidly diminishing over the whole of Cheshire. I made at the time many inquiries as to the truth of this statement, which had found its way into the public journals, and it proved, as is usual in such cases, that the accounts although based upon truth, was very much exaggerated. A diminution in the supply of brine is a phenomenon of no unfrequent occurrence, and is in fact of two kinds—periodical and occasional. A periodical sinking of the water in the brine-shaft is found to occur in the summer season, the brine rising with the approach of winter, and attaining its highest level about December or January: these alterations have generally been very regular, but during the year 1856 a total

departure from the usual variations took place, which, ending in a rapid sinking of the brine during the months of November and December, originated the fears which were entertained of a general failure being at hand. I have been enabled to obtain a statement of the fluctuations in the level of the brine in a pit at Anderton during the two normal years 1854-55, and the abnormal year 1856, by which the matter is clearly exemplified. The shaft upon which the observations were made, was between 70 and 80 yards deep, and the numbers given express the height in yards to which the brine rose.

	1854	1855	1856
January	15-16	30	24—30
February................		35	23—24
March..................	10-7-35-20		18—24
April..................	Gradu-	gradually	18—19
May....................	ally re-	receding	17—19
June	ceding.		17½—19
July....................	6	4	17—19½
August.................	7	4	19—19½
September..............	7	4	19—20
October................	8-20	increasing	20—22
November...............	20-25	22	18—11
December...............	30	30	10—11

By this account it is seen that in ordinary years the average depth of the brine in the shaft is thirty yards in the depth of winter, whilst in the midst of summer five yards may be taken as the mean; and the origin of the alarm in 1856 was evidently the observation of a diminution setting in at a period at which an increase had usually happened hitherto. The fact, however, appears to have been disregarded, that in the warmer period of the year the supply of brine had been far more abundant than was generally the case, nor am I aware that any attempt was made to explain this part of the phenomenon. The sudden decrease was attributed by those on the spot best able to form an opinion to one of those dislocations of strata which frequently on a smaller scale cause the occasional failures in the supply of brine: a sudden subsidence of land in one part of the Northwich district, to the depth of a three-

storied building, is described as having occurred simultaneously with this sinking of the brine, and it was believed that in some of the deserted mines which honey-comb the rock-salt strata of that region, the pillars of salt, which are always left to support the roof, had been removed by the action of water, and the immense weight of the superincumbent mass had then caused the excavation to collapse. By an extensive disarrangement of this nature, either some new channel of escape might have been opened for the brine, or at least the communication between some of the streams or reservoirs might have been closed or interrupted. Similar occurrences, although with a converse effect, have happened in earlier times; and two instances are mentioned by Holland, in one of which, near Bickley, and also in the neighbourhood of Combermere Abbey, the ground suddenly sank to a depth of many feet, and the brine not being removed with the same rapidity as in the present day, forced its way to the surface upon its old subterranean channel or reservoir being filled up, and formed a pool of considerable size in the depression caused by the collapse of the strata.

The failure of 1856 appears to have been partial only, as would be naturally expected if due to the alleged cause; it seems to have been almost wholly confined to the Northwich district; at Winsford it was slightly felt, but was there attributed more to increased pumping than to any natural cause; whilst in the Sandbach department I believe no complaint of any kind was raised. The derangement, such as it was, seems to have been only temporary, for no complaints have since been made of the occurrence of any scarcity.

On the Properties of Wood Oil. By M. Guibourt.

An analysis of *Wood-oil* or *Gurjun Balsam* was made by Mr. Charles Lowe* in 1850. He only knew it as a resinous liquid extracted from an Indian tree and believed it to be balsam of

* Pharm. Jour. Vol. xiv. 65.

Copaiba, rendered turbid by a greenish resin suspended in it. The following were the results obtained by him from the balsam which was found by filtering to give a brown transparent liquid yielding by distillation.

Essential Oil	65
(Hard) Resin	34
Acetic Acid and Water	1
	100

According to Mr. Lowe, the volatile oil possesses all the characters of that of copaiba; and the "*hard* resin," which he regards as pure copaivic acid, free from the "*soft* resin," which, according to him, exists in the greater part of the copaiba of commerce, appears to him indicative of superiority as a medicine. I must acknowledge that I but ill-comprehend this conclusion, and that I am the less convinced of the identity of the *hard* resin with copaivic acid, since Mr. Lowe has recognized in the new resinous balsam the singular property of becoming solid when exposed in a closed vessel, to a temperature of 230° Fah. Copaiba presents no similar phenomenon.

I find stated moreover this difference, viz., that the new balsam distilled with the addition of a small quantity of an oxidizing agent, as chlorine, hypo-chlorite of lime, or bichromate of potash, yields an essential oil of a fine blue, whilst ordinary copaiba containing "*soft* resin" (I still can scarcely understand), affords hardly any coloured essential oil. The notice concludes with pointing out a possible sophistication which appears to me little to be feared; it is, that cold sulphuric acid produces with copaiba a purple colouration similar to that obtained with cod-liver oil, so that, as the author supposes, dishonest persons might substitute for the latter, a mixture of olive oil or of some other fatty oil, mixed with a small proportion of copaiba.

Mr. D. Hanbury* informs us in his notice, that wood-oil is extracted from *Dipterocarpus turbinatus* by a very peculiar process, which I will state in a few words, in order the better to show the nature of the product. To obtain the oil, a large incision is made

* Pharm. Jour. Vol. xv. 321.

in the trunk of the tree at about 30 inches from the ground, on which a fire is lighted and kept up until the incision is charred: soon after this, the liquid begins to flow. It is conducted by a little trough into a vessel placed to receive it. The average produce of one of the better trees in a single season is 30 gallons. Roxburgh (from whom this account is taken*) adds that *wood-oil* is also produced by *Dipterocarpus incanus*, *D. alatus* and *D. costatus*. The first of these three is reputed to yield the best sort, and in the greatest quantity.

The wood oil which forms the subject of Mr. Hanbury's notice has been imported in large quantity from Moulmein in Burmah. When filtered, it is a transparent liquid of a somewhat dark brown color when seen by transmitted light, but appearing opaque and of an obscure green if viewed by reflected light. It possesses therefore, in a very marked degree, the dichroism observable in all resin-oils obtained by the action of fire. I particularly notice this character which determines the nature of wood-oil, and shows that it is not simply a natural product like Copaiba; but that it is in part the result of a liquid modification of the *Dipterocarpus* resin, effected by the agency of heat. This Moulmein wood-oil is of somewhat greater consistence than olive oil; it has a sp. gr. of 964, and possesses an odour and taste very analogous to those of Copaiba. It dissolves in twice its weight of absolute alcohol, with the exception of a minute residue which is deposited upon repose.

But the most curious property of this oil, already recognized by Mr. Lowe, and afresh observed by Mr. Hanbury, is that of solidifying when heated in a closed vial to 266° Fah.; at this temperature the oil becomes turbid and so gelatinous, that it is not displaced upon the inversion of the vial. After cooling, the solidification is yet more perfect; but a gentle warmth, assisted by slight agitation, restore its former liquidity. Mr. Lowe has given the temperature of 230° Fah. for the solidification of the oil: I suppose that the different temperatures noted by these two observers, may be accounted for by some difference in the liquids on which they operated; for as the sorts of Copaiba furnished by different

* Flora Indica Vol. ii. 613.

species of American COPAIFERÆ and the turpentines by various pines and firs, are not identical, so we may reasonably conclude that the wood-oils yielded by various species of *Dipterocarpus* are not absolutely similar; the greater or less degree of heat to which the oil has been subjected in the process of extraction, may also cause a variation in the properties of the product.

What I assert here is not a matter of supposition, but at present of certainty. At the Universal Exhibition of 1855, there were two samples of wood-oil, the one sent from Canara, the other from Tenasserim. One of these samples (I do not know which) enclosed in a small white earthen pot, which in fineness of paste was midway between stone ware and porcelain, had been given by Dr. Royle to M. Delesse, the member of the International Jury who had been commissioned to report upon the bitumen and petroleum forwarded to the Exhibition. M. Delesse, not finding it to be what he was seeking, sent me the specimen, which I judged at once must be the new copaiba announced by Mr. Lowe. In fact, it approached much nearer to the balsam examined by Mr. Lowe than that which has been presented to me by Mr. Hanbury.

The wood-oil of Mr. Hanbury has almost the liquidity of olive oil; held up to the light of the sun, it is seen to be perfectly transparent, and of the colour of dark malaga wine; seen by reflected light, it appears opaque, and of an olive green. With ammonia and magnesia, it behaves in a very different manner from copaiba. Mixed with liquid ammonia of 22° B., in the proportion, by weight, of 5 parts of wood-oil to 2 parts of alkali, it immediately forms an opaque and very thick mixture, which does not alter by keeping.

It does not solidify upon the addition of a sixteenth of its weight of calcined magnesia, and the two bodies separate upon repose.

The wood-oil of M. Delesse has the appearance of a thick and slightly gelatinous liquid. After having deposited a small quantity of green resin which was suspended in it, it became almost transparent: placed between the eye and the sun, it is seen to be of a pure deep red: viewed by reflexion, it still appears red, but tur-

bid, and resembles a liquid in which finely-powdered cochineal might be suspended. The complementary colour of red is not therefore apparent by this means, but it becomes manifest when, after agitation, a thin layer of liquid covers the upper sides of the bottle. Then in whatever way we look at this thin layer, it appears of a beautiful green hue.

This same green colour appears again and remains, when, after having dissolved the wood-oil in alcohol, the solution is left to spontaneous evaporation: one may then see towards the upper part of the capsule, between the portions of green resin, white starry tufts which are due to a peculiar principle, the future examination of which I leave to those who have a larger quantity of the liquid at their disposal. As to the resin, it has acquired a permanent green hue, which is also perceptible in the dry resin which remains after the wood-oil has been boiled for a considerable time with water. This green colour, which is that also of the beautiful Piney Resin (*Vateria Indica L.*) that was shown at the Exhibition, establishes a point of relation between two products originating in trees belonging to the same family, that of the DIPTEROCARPUS. But there the resemblance stops, for the resin of Vateria Indica is insoluble in alcohol, and very imperfectly so in Æther, whilst the green resin of wood-oil is easily soluble in either of these menstrua. Finally, the wood-oil of the Exhibition behaves as copaiba, when treated with ammonia or calcined magnesia. With one-sixteenth of calcined magnesia it very speedily solidifies, and a mixture of it with ammonia becomes liquid, and almost transparent, after an instant of opacity.

I am far from concluding with Mr. Lowe that the two oleo-resinous bodies (copaiba and wood-oil) are chemically identical; but as regards their employment in medicine, I think, as in the case of bodies of analogous composition, such as turpentines and balsams, liquid or solid, all their vegetable components may be of use as a remedy for a catarrhal condition of the mucous membranes. I may remark in conclusion, that Mr. Hanbury's wood-oil, and that from the Exhibition, have probably not been extracted by a similar process. It seems to me that the former has been obtained by the action of fire in the manner described by Rox-

burgh; the latter has doubtless been obtained without the intervention of this agent, for I do not find in it the indication which characterizes oils that are the result of the action of fire upon resins.—*Pharmaceutical Journal, Vol.* 16, *p.* 332.

MR. WAYNE *on the Oil of Cotton Seed.*

THE great quantity of cotton produced in India and the little use made of the seed, save as food for cattle, give value to the following notice of the practice, in America, of extracting an oil from the seed:—

"The manufacture of oil from cotton seed is not a novelty; a small quantity has been made at the South for some years past; lately, however, the demand for lubricators has turned the attention of many to the cotton seed (immense quantities of which are allowed to rot, or used only as manure upon the cotton fields of the South) as a material from which large quantities of oil might be profitably obtained.

"At New Orleans I have been informed that a quantity of this oil has been of late produced, a sample of which I have seen. It was very bland, light coloured oil, said to be made by steaming the seeds and collecting the oil by skimming it from the surface of the water. I cannot vouch for the correctness of the above process.

"In Cincinnati some of the oil millers have made the attempt of pressing cotton seed for the oil, but the experiments so far, I believe, have been unsatisfactory, both in regard to the quality of the oil obtained and in the cost of it.

"The oil, to be made profitably, should either be manufactured in the vicinity of the cotton plantation, as the seeds from the attached fibre are bulky, and the cost of transportation an item; or the seed should be hulled at the spot and shipped to the place where it is to be pressed in that condition, as it requires three or four bushels of seed in the wool to produce one bushel of hulled seed ready for the mill.

" The oil as it runs from the press is of a very dark red colour. After standing some time it deposits a portion of the colouring matter, also a portion of the semi-solid fat, and in cold weather this is deposited to a large extent; and is only partially taken up upon increase of temperature. The colour of the oil obtained by pressure is one great objection to its general use, and is very difficult to remove; in bleaching it, at least ten or fifteen per cent. of the oil is lost, a portion of which may be recovered, and used in the manufacture of soap, for which purpose cotton seed oil is better adapted than for any other purpose. It is a drying oil, consequently not fit for lubricating, and when burnt gives a smoky flame, and forms rapidly a crust upon the wick. Others say that it answers for both purposes; but all I have met with, upon being used practically for lubricating or burning, gave unsatisfactory results.

" A very good soap is made from it in New Orleans for common purposes: but I think that a soap in every respect equal to the imported Castille could be cheaply made with it.

" The dark colour of the oil obtained by pressure is due to the presence of a dark resinous substance, presenting itself in small dots throughout the seed. These may readily be seen by examining a section of the seed with a lens, or even the naked eye.

" The hull and attached fibre are useful for paper stock, and the cake left after the extraction of the oil is nearly as valuable a food for cattle as that of linseed.—*Pharm. Jour. Vol.* 16, p. 335.

ORDER RADIATA.*

Class Hydromedusæ.

ALL Medusæ are naked jelly-like animals, with a body sometimes disc, sometimes bell-shaped, the edge of which is often furnished with threads, and which by its alternate contraction and ex-

* We are indebted to Captain Toynbee of the *Gloriana*, for this translation from a German work descriptive of various families of pelagian animals. It was made by him for his own use during the interesting researches he has been engaged in carrying on for the last 3 or 4 years among these tribes during his voyages to and fro between India and England.

pansion propels it through the water. On the lower surface of this glass-like transparent body the mouth is to be found, or the sucking organ which takes the place of a mouth, often surrounded by stalk-like appendages; and these together with the umbrella-shaped body, give them much the appearance of mushrooms.

The bodies of the Medusæ are composed of cells; about as hard as gristle, covered by a tender upper skin, in which stinging organs are to be found, generally similar to those of the Polypi; indeed all who are accustomed to bathing in the sea can testify to this from painful experience. The disc-shaped body is of a very decided radiate type, being always divisible into 4 or 6 complete segments:—the long contractile threads which are placed on the edge and seem to be used as feelers, also obey this rule.

The nervous system and organs of sense are considered to reside in certain bodies which are imbedded in the edge of the disc, generally to the number of 6 or 8. They consist of some capsule-shaped little bladders, in which is contained a round or angular crystalline kernel. In some genera these little bladders are surrounded by a brightly coloured pigment, which has caused some observers to consider them as eyes, while others have thought them a rudimentary form of ear.

The digestive organs are formed in a very peculiar manner. The mouth is generally simple, sometimes surrounded only by a raised margin, but more frequently by seizing arms of the most varied shapes, which often possess raised margins, formed like a ruff. In some genera instead of one single mouth opening there are very fine sucking-apertures, which open either into a simple middle stalk, or into many feelers, which are again branched in their turn. Both the simple mouth and the fine pipes which lead up from these sucking apertures conduct into a larger or smaller stomach cavity, which generally possesses a certain number of sacks radiating from it. From these sacks spring a certain number of vessels which radiate towards the edge, and there disappear into one of the edge-vessels, or into an extremely delicate network of smaller vessels. In this manner the whole body is traversed by the nourishing fluid, and not seldom the remains of little animals are to be found in these canals, still undigested.

We cannot hope for a well grounded classification of the Medusæ until the connection between them and the Polypi is properly established; many different forms abound in all seas, but can now only be classed according to the normal number and arrangement of their organs.

The family of the "Mushroom-medusæ" (*Medusidæ*) has a roundish umbrella-shaped covering, with a four-sided mouth in the middle, which is surrounded by four seizing arms: indeed all the organs are arranged according to the number 4; the bodies on the edge, of which there are at least 8 of a brilliant red, and in young individuals are so clearly jagged outwards that they appear as if lying on cone-like extensions. To this family belong the "Ear-medusæ" (*Aurelia*) the "Sea-lamps" (*Pelagia*) see plate iv. fig. 1, and many other widely spread genera. *Medusa*, *Cyanea*, *Ephyra*, *Chrysaora*.

Very nearly related to this is the family of the "Sea-medusæ" (*Oceanidæ*) the organs of which are also arranged according to the number 4. The body is bill or hat-shaped; the mouth simple, and placed at the end of a long probosics; the threads attached to the disc are branched in some genera, in others simple. To this family belong nearly all those Medusæ which have been considered as direct descendants of the "Tube-polyps" (*Tubularidæ*) and have been called *Cladonema*, *Sthenyo*, *Callichora*, *&c.*, *Oceania*, *Thaumantias*, *Cytacis*, *Callirhoe*.

The family of the "Disc-medusæ" (*Aequoridæ*) has a flat lentil-shaped disc, with colourless bodies on the edge, and generally very short threads. The number 6 seems to reign amongst them; the mouth is uncommonly large and not surrounded by any seizing-arms. *Aequorea*, *Cunina*, *Eurybia*, *Aegina*.

The "Hair-medusæ" (*Berenicidæ*) have a flat bill with innumerable extremely fine hairs at the edge, through which very thin canals seem to rise upwards. In the disc itself only one vessel can be seen, resembling a branching cross, so that the number 4 seems to rule here. Apparently the nourishment is sucked in by means of the threads at the edge; at least no digestive organs have hitherto been discovered.

The family of the "Root-medusæ" (*Rhizostomidæ*) is better known than the preceding. Under a bell-shaped covering are seizing arms governed by the number 4, which are sometimes branched, and at the ends of which are sucking apertures which lead into a roomy stomach;—see fig. 2, plate iv. There is no mouth, and the vessels proceeding from the stomach form an elegant net-work at the edge of the bill. The bodies on the edge are of a bright red. Some genera of this family attain a diameter of several feet. *Rhizostoma*, *Cephea*, *Cassiopea*.

The family of the "Proboscis-medusæ" (*Geryonidæ*) has no mouth, but under its bell-shaped disc a very moveable massive stalk, in which rise six channels and open out into a six sided little stomach. The bodies on the edge are also arranged according to the number 6 and are colourless. The end of the proboscis, where we find the six sucking apertures is sometimes in folds, sometimes set with ciliæ;—see fig. 3, plate iv. *Geryonia*, *Favonia*, *Saphenia*, *Lymnorea*.

As almost the whole class of the Medusæ consists of soft gelatinous animals, we cannot expect to find their fossil remains, yet some confused impressions in the slates of Sohlenhofen seem to prove that the ancient seas were inhabited by Medusæ. The little trees also on which the bell-polyps are formed are too soft to have left any traces. In the present day both forms of the class are to be found in abundance in all seas, and are pursued by the *Ctenophoræ* by swimming snails which feed on them. The greater number shine by night with a trembling yellow light, which increases in brilliancy when they are in motion.

Class Siphonophora.

This class is a strange mixture of curious animals, merely being placed together in consequence of our extraordinary ignorance of their organization. In fact we do not know whether they are to be considered as simple animals with many sucking-apertures, or as a swimming polyp-stock, on which common stem a number of simple polyps are placed:—their anatomy is not understood, for neither their nervous system, nor organs for seeing, breathing or hearing have yet been found.

The family of the " Sea-bladders" (*Physalidæ*) commonly called Portuguese Men-of-War consists of a bladder-shaped body of gelatinous consistency, on the lower surface of which are a quantity of worm-like sucking apertures, feelers and very lengthy seizing-threads. The body consists generally of 2 bladders which envelop each other, the inner one being completely closed and filled with air, while the outer one has a comb at the top, which the animal uses as a sail when swimming. The outer gristly bladder is used too as a covering for the threads and feelers, which can draw themselves back into it: see fig. 4, plate v. Little bunches of red bodies are often found at the base of the sucking-tubes, and have been supposed to be eggs. These beautiful animals of a delicate pink and blue color swim in crowds on the surface of the southern ocean, and when touched can sting so severely that they were formerly considered poisonous. *Physalia*, *Discobale.*

The family of the "Gristle-medusæ" (*Velellidæ*) possesses a cellular disc of a gristly substance, sometimes containing calcareous deposits, and on the lower surface of which the bodily organs are placed;—see fig. 5, plate v. The cells of the disc are filled with air and thus give the body a certain specific lightness. In the middle of the lower surface of the disc is a large opening which some consider to be the mouth; around it are many small openings, also of a vermicular form, which some have considered to be feelers, and others sucking apertures. At the base of these are to be seen little clusters of small bodies the purpose of which is still doubtful. The animals of this family which are generally of a beautiful blue, appear at certain times in countless swarms in the Mediterranean, and in the ocean within the Tropics. The genus Velella, the only one in the Mediterranean, has a sharp upright comb on the disc, while the genus Porpita which inhabits the Southern seas has a simple round radiated cellular disc. *Velella*, *Porpita.*

The family of the " Double-medusæ" (*Diphyidæ*) consists of a number of more or less united beings, the structure of which is much more complicated than that of the preceding animals. There are to be found in the sea single bodies of a glassy transparency, which however consist of two pieces, a covering piece, and a flap-

ping swimming cavity which is generally shaped like a hollow bell, and is provided with an opening which is actively opened and shut: and the water streaming out of the swimming-bell drives the animal forward by its rebound. Under the covering piece there is a worm-like sucking body which in its extension shows a mouth of angular radiated form, at the base of which are hidden uncommonly long seizing and stinging threads.

It is still a question whether these animals, which principally form the genus Diphyes, are not detached pieces of one composite animal; for there are cases, where such creatures are these, are found in the sea to the number of forty or more, attached to one common stalk, at the upper end of which are two large swimming-bladders, each of which seems to contain an oil pustule:—see fig. 6, plate v. Each single animal can move independently, but the extremely contractile stem has also a proper motion, and the whole is drawn hither and thither through the water by the two large swimming bladders with great ease. The stem is hollow, and the nourishing fluid from the different animals circulates in its tube.

In other genera, for example Stephanomia, the union of the single animals is still more intimate. The swimming-bells are placed sometimes in rows, but more generally irregularly at the fore-end of the stalk, which contains an air-bladder. On the stalk itself are countless worm-like sucking apertures, each surrounded by a quantity of seizing and stinging threads. There is no more extraordinary spectacle than such a creature which swims in the sea with all its organs extended, like a transparent reddish plume of feathers about a span long, but when caught or touched the stalk draws up with an elastic impulse, and it transforms itself into a shapeless lump of jelly so that the tyro sorrowfully throws away his unfortunate prize. Is it a simple animal with swimming bells and sucking tubes, or a Polyp-stock adapted for swimming with various animals thrown swimming and eating? Further enquiries must give the answer to this question. *Physophora; Diphyes; Ersaea; Rhizophysa; Agalma; Hippopodius.*

Order Mollusca.—The extremely numerous kingdom of the Mollusca is made up of such very different animals, that it is scarce-

ly possible to give any one characteristic distinctive of all. The separate classes indeed are sharply divided, and the whole kingdom is divided into two sub kingdoms which differ so much from each other that they ought rather each to form one kingdom.

In many Molluscs, the outer appendages of the body, the organs for moving, the feelers, &c., are symmetrically arranged, but this order is far from embracing the whole body, for the interior organs are often most unsymmetrically arranged. The nervous system is divided into two different types. In the Molluscoids we find but one knot of nerves, which stretches out its branches in all directions; in the Mollusca on the contrary, the nervous system consists of scattered knots, which are strewed rather irregularly over the body, and connected with each other by threads :—the arrangement of these knots is however so varied that we must take them in connection with each different order. The organs of the senses too are equally varied, sometimes wanting altogether, sometimes well-developed. Feelers are seldom to be found as the whole surface of the soft body is susceptible of outward imprcssions, yet there are sometimes lips, or flaps placed round the mouth, sometimes hairs or arms, and sometimes contractile feelers, all of which are evidently for the purpose of feeling. The seeing-apparatus is not developed in all ; in some there is found only one rudimentary eye while others possess a great number of incomplete eyes which are not even placed in the neighbourhood of the head ;—in the higher classes indeed, where there is but one pair of eyes which are placed in the head, they are developed to a very important degree. In the Molluscs we meet with hearing organs for the first time: they are round bladders, sometimes possessing a short but important hearing-nerve. Inside these bladders a clear fluid is to be found, and a firm concretion of carbonated lime, which sometimes forms one round hearing stone, sometimes many, which are crystalline: these seem to be kept in constant tremulous motion by ciliæ which clothe the inner surface of the bladder.

The skin of the molluscs is more or less leather-like, generally provided with a slimy slippery covering ; in a few it is glassy clear and transparent; but in the greater number we find shells, which

are more or less developed according to every variety of type, and are very important in the classification of these animals.

Many Molluscs remain fixed to the ground except during their larval condition; others creep by an extraordinary organ woven out of muscular threads which is called a foot; many swim, some by sucking in water and then expelling it by a rapid contraction of the body; others by actual swimming organs which sometimes consist of rows of membranes covered with bristle like hairs, and sometimes of swimming-flaps, attached to various parts of the body.

The circulation of the blood is in a high state of development in most Molluscs, for they often possess a heart divided into several chambers, with both veins and arteries spreading though the whole body; but this as well as the breathing organs vary much in development in the different classes.

The greater number of Molluscs live in the water, the lower classes almost all in the sea, and it is only the higher classes which possess some genera living exclusively on land:—even these earth inhabitants however prefer damp swampy places and are destroyed by complete drought. The creeping genera prefer the lower surface of stones and water-plants, many bore into sand and still, even wood and limestone are not safe from their attacks. The actual swimmers all live in the sea, and are often met with on the open ocean.

The Molluscs belong to the first inhabitants of our earthly ball, and by the strength of their shells which have been preserved in large masses, have done great service to Geology. We shall only be able properly to consider their development in the different strata, when we have learned thoroughly to understand the peculiarities of the different classes and families.

SUB KINGDOM OF THE MOLLUSCOIDS.

The Molluscoids distinguish themselves by their very unsymmetrical form, and by only possessing one ganglion, which is generally connected with an eye-like organ placed immediately upon it. A separate head is never found amongst them, for even in those classes which like the "moss-animals" (*Bryozoa*) possess a mouth opening surrounded by feelers, there is never any division between

it and the rest of the body. In all other respects the three classes that compose the sub-circle of the Molluscoids differ altogether, so that we must consider their peculiarities in the respective classes, which are :—

1st. The " moss-animals" (*Bryozoa*) distinguished by their resemblance to polyps, their seizing arms and their social form; a few genera inhabit fresh water.

2nd. The " Rib-medusæ" (*Ctenophora*) with rows of swimming in the water and jelly-like bodies; these all live in the sea: and

3rd. The " Mantle-animals" (*Funicata*) of highly unsymmetrical build, enveloped in a broad mantle, and without peculiar organs of motion; these all live in the sea.

Class Bryozoa.

These animals so much resemble polypi in their outward growth that they have often been confounded with them, but their internal structure will be found to be altogether different.

The Bryozoa are little polyp-like animals which form colonies, and are always surrounded by cells into which the animals can retreat, partially or entirely. The cells are sometimes horny or pliable like parchment, sometimes soft and jelly-like; sometimes they stand on their own stalks which rise out of a network of tubes, which spreads itself by runners in the same way that many plants creep along the ground, but then rises and branches out. But in most cases and particularly in the sea Bryozoa the cells are of a calcareous nature, and then resemble the forms of many corals, possessing however hairs and horns which the coral-polyp never has. Moreover in some cases the Bryozoa cells are furnished with a covering which can be closed when the animal has retreated into its case; and even when the cells are leathery, the fore-end can be contracted so as to enclose the animal completely.

In some of the genera living in the sea (*Cellularia*, *Bicellaria*, *Flustra* and *Telegraphina*) very strange organs have been discovered, the use of which is still quite unknown. They are seizing organs which look not unlike a bird's head:—see fig. 7, plate v., possessing a very strong upper and a very thin lower pincer.

These organs are in constant swinging motion like a pendulum, and the pincers are opened and shut from time to time which must be the result of a muscular action. Apparently these organs are analogous to the Pedicellaria of the Echinodermata, for like them, their motion continues after the death of the animal. In the genus Telegraphina, instead of these organs there are long stiff threads on the edge of the cell, which are also in constant swinging motion.

Eyes and ear-bladders are wanting altogether; the spots which in some genera have been taken for eyes, are not connected with vision.

In all the Bryozoa there is to be found at the upper end of the body a circle of actively moving seizing threads, each of which is hollow, and connected with the cavity of the inside of the body, and in which the fluid which fills the body is driven up and down. The seizing threads are set with delicate hairs, which by the eddies they occasion in the water drive the food, little animals, &c. towards the mouth which lies in the middle of the circle:—they may be useful also as a breathing apparatus, which would otherwise be quite wanting in the Bryozoa.

The polyp stocks of the Bryozoa, which are mostly very small and inconspicuous, are found in great numbers both in fresh and salt water, on all possible substances under waters. They are numerous too in the different strata of the earth especially in the purassic formation.

This class is divided according to the position of the feelers into 2 orders. In the "circle-whirlers" (*Stelmalopoda*) the feelers stand in a circle round the mouth; all the genera which belong to this order live in the sea. It is they alone that possess calcareous dwellings, and therefore are found in a fossil state. According to this and the arrangement of the cells, the order is divided into 4 families.

1st. The "Thousand-whirlers" (*Mitleporida*) which have calcareous, generally finger shaped branching polyp-stocks, in which the simple round cells are so confused, that at most a part of the upper opening appears free on the surface. These animals are

very little known, but seem to distinguish themselves principally by their long feelers. *Millepora*, *Retepora*.

2nd. The " Tube-whirlers" (*Tubuliporida*) which are also of a calcareous nature are nearly free, and only touch the common mass by their extreme end. They are now found in the Southern seas especially, and various genera of this family are to be found in a fossil state from the most remote periods. *Tubulipora*, *Cellularia*, *Crisia*, *Hornera*.

3rd. The " Crust-whirlers" (*Escharida*) are easily distinguished from the foregoing families as their round or egg-shaped cells can be completely closed by a moveable covering as soon as the animal is withdrawn. The genera which belong to this family are numerous both in our present seas and in a fossil state. *Eschara*, *Flustra*.

4th. The " Bell-whirlers" (*Lagunculida*) comprise all those Bryozoa which together with a crown of feelers possess a leather-like cell, and which are generally placed on long stalks on moveable root stocks. *Laguncula*, *Tendra*, *Bowerbankia*, *Holodactylus*.

The order of the " Arm-whirlers" (*Lophopoda*) inhabits fresh water.

Class Ctenophora.

The glassy transparent animals of more or less symmetrical form which belong to this class and are to be met with swimming in the sea, have been hitherto classed with the disc and the Tube-medusæ in a particular class of Medusæ (*Acalephae*) though besides their glassy transparency, they have not a trace of organization in common with them.

The " Rib-medusæ" (*Ctenophora*) are generally egg or cucumber-shaped, sometimes very broad with a mouth at one end of the body. The organs of motion and the vessels are generally so arranged that they appear like rags to an axis drawn from end to end, while the stomach and ganglious represent the bilateral type. In some the symmetrical type is still clearer as the body is drawn out sideways, even extending itself into a long oblique band in the middle of which the digestive organs are placed.

The skin of the Rib-medusæ is naked, and sometimes, like the Arm-polyps, furnished with holding organs out of which rises a

stiff little hair. These are only to be seen with the microscope, but there are also rib-like lines on the surface of the body, on which the swimming organs are placed. These consist of long stiff hairs placed in oblique lines, which are sometimes united at their base and are moved backwards and forwards in swimming singly and in union they depend altogether on the will of the animal. These swinging ribs scintillate with the motion of the animal in the most beautiful prismatic colours, and one may see clearly how the animal by oblique turns and twists sometimes uses this edge, sometimes that, leaving the others at rest. Thus these animals progress through the water with their slightly contractile bodies, without any other visible motion.

The digestive-apparatus of the Rib-medusæ is exceedingly simple. The mouth is to be found in the axis of the body, and leads immediately or by a longer contraction into a large cavity, the stomach, which in its turn contracts, and debouches by two side fissures into a funnel-shaped hollow, which is intended for taking in water. The mouth is generally furnished with very long, extremely contractile seizing threads, which are branched, and usually lie in peculiar sheaths inside the body where they are in constant worm-like motion. These threads are armed with organs both for stinging and poisoning which it appears that they use against their prey.

Above this funnel shaped cavity lies the simple ganglion, from which distinct branches radiate on all sides, and on which is placed a little bladder, in which a quantity of crystalline calcareous particles are kept in tremulous motion; we must therefore consider it as the rudiment of an ear-bladder. Other nerves and organs of the senses there are none. From the funnel-shaped cavity spring canals which run along the ribs of the swimming-flaps and show a tremulous motion in their inside;—these may be for leading in water, or they may be breathing organs, of which we otherwise discover not a trace.

The organization of these animals which are to be found in numbers in every sea is so uniform that there is no need to divide them into different orders. We distinguish two families:—

1st. The "Gerkin-medusæ" (*Beroida*) have generally an egg-shaped or round body, with a large mouth, a wide stomach-cavity, and 8 rows of swimming-membranes which run in regular lines along the body. See fig. 8, plate v. They are very agile and voracious animals pursuing other medusæ in particular. *Beroe*, *Leseuria*, *Medea*.

2nd. The "Band-medusæ" (*Callianirida*) possess but a very small mouth opening, and an extremely narrow stomach, but they very often have seizing arms and side flaps, on which the swimming-membranes are arranged. To this family belongs the well-known Girdle of Venus (*Cestum Veneris*) a band about the width of three fingers, from four to five feet long, with a narrow mouth in the middle of the beautifully iridenent band. See fig. 9, plate v. *Cestum*, *Callianira*, *Alcinoe*, *Cydippe*, *Eucharis*, *Mnemia*.

From the gelatinous substance of these animals it is no wonder that we cannot be certain of any fossil remains of them.

Class Tunicata.

The animals form this class distinguish themselves from all others by their highly unsymmetrical build. In the greater number of families it is a simple impossibility to recognize a middle line or axes round which the organs are placed in any regular form; it is only in the higher families that a lateral arrangement can be perceived, and these not very distinctly. The bodies of the animals are generally irregularly cylindrical, egg or wart shaped, without any exterior sign of division into different parts.

The outer covering of the body always consists of a loose skin, which is more or less tough, and encloses the whole body like a bag and possesses only two openings, one for the ingress of food and water, the other for the exit of the same. This mantle, which is sometimes gristly, sometimes like jelly or leather, is for the greater part of its mass composed of true woody fibre or *Cellulose*, which does not dissolve in acids or alkalis, and forms the hard constituent part of plants. The inner structure of this mantle has been thoroughly examined; it consists principally of clear foundation, substance in which not only fibres and cells are to be found, but often variously formed crystalline aggregations of carbonated lime.

In the case of the sea-sheats which are social the outer mantle of of the various individuals, unites so that a common jelly-like covering is formed, in which the separate animals are placed and from which they can easily be freed.

Some of the Tunicata live either in colonies or separately each are attached to the ground; in this case their only activity is confined to a lazy opening and closing of the openings in their mantle. The free-livers can swim, and perform the feat in this remarkable manner:—they suck in water with great activity, and then ejecting it with equal force, the backstroke of the gushing water drives them forward. In those cases where individuals are united in chains all swallow and eject water simultaneously and in the Pyrosomidœ where many individuals are united in one swimming mantle, the mantle itself moves them on.

The nervous system of the Tunicata consists of but one large ganglion which is to be found on the back surface near the ingress opening. In the Salpœ this ganglion, which is kettle-shaped, bears on it the single eye, which is generally surrounded by a dark red pigment. Other organs of the senses are completely wanting.

The circulation of the blood is most clearly developed, and the motion of it is always carried on by a bag-shaped heart which is either placed near the breathing organs or at the bottom of the body: from this heart are expelled streams of blood, which either run in canals, or spread themselves in the interstices between the organs. But the peculiar and remarkable circumstance is that in all the Tunicata the direction of the stream of blood changes periodically. The heart makes a certain number of pulsations in one direction, then it stands still suddenly, and recommences its pulsations in the other direction. So it varies at irregular intervals, often of several minutes, and in all the vessels one sees the blood change, streaming first from left to right, then stop, and then take the contrary direction. In the transparent Tunicata one can easily convince oneself that these changes originate solely in the heart:—one cannot therefore speak of veins and arteries as the direction of the circulation is constantly changing.

The breathing-apparatus is highly developed according to two different types. In the Ascidiæ the water enters through the

opening in the mantle into a large gill-bag, the whole inner surface of which is covered by a lattice work of oblique meshes, each mesh being furnished with ciliæ in constant motion. The eddy occasioned by these ciliæ draws the water through the outer opening into the gills. Each mesh forms a slit through which the water flows outwards, and it is then thrown out through the other opening in the mantle. In the case of the Salpœ on the contrary, the gill-bag forms the greater part of the body, and the gills have the appearance of crooked beams stretched out from above to below and from end to end of the bag. The wall of the gill-bag is completely smooth, but each beam is full of a great number of vessels. The water is swallowed in at the fore-end, winds round the gills, and is then expelled at the hinder end.

The order of the Ascidiæ consists of extremely unsymmetrical animals, the two openings in the mantle of which are generally very near each other, and attach themselves in jelly-like lumps to rocks and sea-weed ; it consists of four families :—

1st. Ascidiæ compositæ.

2nd. Ascidiæ sociales.

3rd. Ascidiæ simplices.

4th. The " Fire-cones" (*Pyrosomida*) which form a kind of link between the composite Ascidiæ and the following order. One finds swimming in quantities in the Southern seas, jelly-like bodies, sometimes a foot long, which are rather of the shape of a fir-cone, and show a large internal cavity which possesses a circular opening at the broad end. The cone swims slowly with changing contractions, by which it expresses the water from its inside. By night it shines with a clear splendour like iron at a white heat. The light begins at a small point and spreads trembling over the surface of the cone till the whole is in a glow. When such a cone is narrowly examined it is found to be the common mantle for a number of animals much like the Ascidiæ ; they approach them in the structure of their gill-bag and in their mode of propagation, but their distinct eye on the large ganglion, their power of swimming, their phosphorescent nucleus and the position of the openings in the mantle proclaim their affinity with the Salpœ.

The order of the " Cylinder-sheaths" or Salpœ (*Biphora*) embraces swimming animals of glassy transparency which are particularly numerous in warm seas. The greater part of the body is formed of a gill-bag, often furnished with extraordinary points and appendages :—it clearly consists of an outer and an inner covering, in which are placed bundles, or oblique bands of muscular fibres. The digestive organs and the heart are pressed together into a little round ball which has been called the kernel or nucleus :—this is generally red or yellow, seldom blue, and shines by night with a lively reddish-yellow lustre. At the fore-end of the cylinder-shaped body is an oblique opening surrounded by moveable lips which leads into the wide gill-bay. The ganglion with its nerves radiating in all directions is very distinct, as is also the eye surrounded by a dark brownish red colouring matter which is placed on it. On the lower side of the gill-bag there is a groove set with ciliæ, and a wrinkle also ciliated near the mouth, the uses of which are not yet known.

The Biphora are found swimming in various social stages. Generally they form chains, in such a manner that long rows of individuals are attached to each other by the pointed prolongations of their bodies or by their sides, so that one sees a long band swimming in the sea, set with a quantity of red nuclei in alternate rows. All the animals inhale and exhale water at the same time and thus the chain progresses. An animal which is once separated from the chain (see fig. 10, plate vi.) cannot unite itself to it again, for it clings to its companions only by hardened slime. There are however Salpœ which never form into chains under any circumstances, and which do not agree in their form with the chained individuals. They were formerly considered to be of a different kind, but modern investigations have proved that chained and single individuals, however they may differ in their outward appearance, are all of one and the same kind in different stages of development. In all the Biphora there is to be found in the neighbourhood of the heart a kind of knot or cone, in which a strong stream of blood rises and falls, and which at first looks very unimportant. After some time one may see on this cone little wart-like protuberances, which grow by degrees till they form a circle of embryos placed round the cone.

This budding-cone is extremely productive, as one may often see three or four rows of embryos in different stages thus coiled round it, which when they have reached their proper size, separate themselves from it, and swim away as a chain.

These single individuals are very rarely to be met with without a chain of embryos round their cone, but here a most remarkable circumstance comes in;—during the time when the chained animals are still in an undeveloped condition round the cone, an egg is formed on their surface which grows by degrees till it projects into the gill-bag, and after a time becomes a separate individual, though its stages of development have not been regularly traced. This formation of an egg in an animal itself undeveloped, has something in it most mysterious.

However it may be it is certain that every kind of Salpœ consists both of chained and of single animals; and that the single individuals produce rows of Salpœ, while the chained individuals produce one each which remains solitary during its whole life.

There is but one family *Salpœ*, though several genera are probably yet to be discovered in it.

There are no fossil representatives of the whole class of the Tunicata.

Sub kingdom of the Mollusca.

Class of the Cephalophora.

Sub-class of the Pteropoda.

This sub-class consists of a few and insufficiently-known Molluscs, which all distinguish themselves by wing-like projections on the head which were at first supposed to be gills, but are really only swimming organs composed of an endless number of crossed muscular bundles. These little animals support themselves on the surface of the sea by these swimming-flaps, and are very seldom driven by accident into the neighbourhood of the shore. They are all nocturnal animals, rising with the twilight in countless swarms out of the depths of the sea, and sinking down again with the morning light. The whole of the day not a brace of them is to be

seen, and many kinds come to the surface only on the darkest nights. Their swimming flaps are in constant swinging motion like the wings of a butterfly, but at the slightest danger they draw them in, and sink back into the dark abyss. The greater number of them possess a very thin horny shell which encloses the whole body of the animal, except the mouth and the swimming flaps. Some of them are quite naked and then they have a firmer skin.

These animals show the low grade of their organization in all their organs without exception. The greater number have no regular head and therefore neither feelers nor eyes :—only two genera possess eyes, in the others they are altogether wanting, though hearing organs are pretty generally developed. The mouth is generally unarmed, often surrounded by short prolongations which sometimes bear sucking cups. Their anatomy and development are so little known that we cannot arrange this sub-class property into orders.

We distinguish two families. The " Crystal-snails" (*Hyalida*) possess a shell, sometimes spindle, sometimes shoe-shaped, sometimes spiral, and of extreme tenuity and bitterness, which causes it to fetch a very high price with collectors :—feelers and eyes are altogether wanting and no distinct head is to be perceived: see fig. 11, plate vi. The mouth is to be found between the two swimming-flaps, which stand horizontally on each side, and can generally be drawn back into the shell. They live in all seas, rising to the surface in swarms in the evening. Shells belonging to this family have been found in the Tertiary strata, but whether the so-called concelarias which are to be met with in great numbers in the transition formation really belong to this family is very doubtful. *Hyalea, Limacina, Cymbulia, Cleodora, Eurybia.*

The family of the " whale-snails" (*Clioida*) is divided from the former by the want of a shell, the possession of a distinct head generally of feelers and in one genera of eyes. Those which abound in the North South Polar seas, form a principal part of the food of the whale, and as the whole little animal is scarcely an inch long, it may readily be imagined what enormous masses of them are required to feed their gigantic enemy. *Clio, Pneumoderma.*

Sub Class of the Heteropoda.

This sub-class comprises a few swimming animals with spindle-shaped bodies, which are glass-like and transparent, and sometimes possess a pretty little shell, which however contains but a very small part of the body. The swimming apparatus consists of a keel-shaped float or fin, which is turned upwards when the animal swims. The head is distinct, and provided with feelers more or less well formed, and generally possesses two large eyes and a long proboscis, at the fore-end of which the prickly tongue is rolled up.

We distinguish three families:

1st. The "Atlantides" (*Atlantida*) possess a snail-like shell into which the animal can withdraw completely. The head is provided with feelers, eyes and a short proboscis, and is placed on an elongated neck, on the lower side of which are placed the swimming flaps provided with a sucking cup; and a tongue shaped prolongation bearing a thin legument which closes the opening of the shell when the animal is entirely withdrawn. *Atlanta.*

2nd. The family of the "Keel-snails" (*Firolida*) is either entirely naked, or has a little cap-shaped shell. The body is sometimes as much as a foot long, spindle shaped and so transparent that in a perfect specimen all the peculiarities of the organisation can be clearly traced. These animals appear in swarms on the surface of the Mediterranean but their shell is so brittle that it is seldom obtained perfect. *Carinaria*, *Pirola*, *Pterotrachea.*

3rd. The family of the "Arrow-snails" (*Sagittida*) is only placed provisionally in this sub-class:—it consists of little spindle-shaped animals with a distinct head which have hitherto only been found in the Mediterranean and North seas. (See fig. 12, plate vi). At the sides of the body are two pair of horizontal swimming flaps, and the tail end is surrounded by a swimming flap, shaped something like the feathered end of an arrow. The mouth is armed with lateral hook-mandibles, and on the head are two slightly developed eyes and feelers. The activity with which this animal moves is remarkable. *Sagitta.*

NOTES AND QUERIES.

We announced in our last number, vide Vol. 3, page 266, that it was intended under the above head to afford an opportunity to all persons of soliciting, or affording, information of a literary or scientific character, or with reference to subjects of peculiar interest in this country. As we have reason to believe that the proposed plan and rules regarding it are not sufficiently known, we reproduce them here for general information: and we trust that many of our Correspondents will favor us with materials for the regular continuance of this department of the Journal.

It is proposed that all Notes and Queries are to be numbered consecutively from the commencement, in order to facilitate more easy reference hereafter.

The following rules are to be adopted with reference to the subjects of enquiry and the method of authenticating communications.

(1). Notes and Queries submitted by Correspondents should be confined to those of a scientific and literary character; the queries should be put, and the answers given in the plainest and most concise form. As several communications will frequently be sent in answer to the same query, the *substance only* of these will be given; except where the answers differ in material points, when the opinions of each writer will be recorded.

(2). Correspondents in forwarding Notes or Queries should authenticate their letters, not only for the satisfaction of the Committee, but chiefly as a means of communicating with the writer should further enquiry be necessary. The name of the Correspondent will be appended to his first communication, and his initials to all subsequent notes, &c.

We purpose submitting in our next number a series of queries for reply. And we hope, on that occasion, also to give answers to some of the queries (1 to 7) before proposed. To one of these we now insert a reply, for which we are indebted to the kindness of Professor Mayer.

" *Query* No. 5. A peculiar concretion resembling lime or gypsum is occasionally found in the heart of teak logs. It generally collects in what carpenters call a " shake" in the wood, but with this exception the logs are perfectly sound, and no communication whatever with the external air has been observed. Is its chemical constitution the same as that of the " tabasheer" or bamboo salt. (Mr. Hawkes).

Reply by J. E. MAYER, ESQ., *Professor of Chemistry Madras Medical College.*

IN answer to the foregoing I beg to submit the following report of an examination of a Calcareous found in the rift of a log of Teakwood.

The Chemical composition of the white incrustation enveloping what has been ascertained to be woody fibre is the following.

Bases.	*Acids.*
Iron.	Carbonic.
Lime.	Silicic.
Magnesia.	Phosphoric ?
Potash.	Scarcely perceptible trace.

The examination not having been quantitative, the expressions employed to indicate quantities are merely approximative and comparative. Thus the base present in largest amount is certainly magnesia, but the percentage though probably exceeding 50 parts of the whole can only be thus suggested in like manner silicic acid, is in considerable amount while the carbonic acid is in small quantity, and the phosphoric in an inappreciable one, reverting to the remaining bases, iron, is present in small amount, so is lime, potash in somewhat *larger* quantity.

The substance formed by the bases and acids above specified, may be regarded as a natural kind of calcareous cement, not very dissimilar to our mortars except that it possesses a larger amount of silicic acid in a soluble form. The substance as a whole must be looked on a mixture, and not a true chemical compound, though containing such compounds, viz. carbonates and silicates of magnesia and lime and potash of which indeed the substance

is almost entirely composed, the iron being casually present and the excess of base being due to the gradual liberation of carbonic acid, occasioned by the act of deposition and the presence of silicic acid in a soluble form. The solubility of the alkaline earths is due to excess of carbonic acid which as it is liberated leaves the silicates of potash and magnesia with some carbonate and iron, in the plastic form, at first, but becoming hard with lime.

As a whole the substance thus hardened is insoluble in cold, and but slightly so in water of higher temp. At 212°, however, there is sensible action after a time. In diluted hydrochloric acid, solubility ensues hastened by increased temp. Solution is attended by slight effervescence, some carbonic acid being liberated.

The natural processes by which the changes just noticed are brought about are probably the following.

Water from rivulets, mountain torrents or streams always contains some carbonic acid, although it may be a mere trace, or a considerable quantity. This being mainly dependent on the amount of vegetable matter, leaves, woody fibre, &c., over which it has traversed, thus impregnated, the water becomes a powerful solvent of alkaline earths, and other matters presented to it, in its course through, or ever the various striata of the earth, and in this way we find it holding silica alkalies, lime and magnesia as well as iron in solution, chiefly in the form of *bi-carbonates* after water has thus become a means of dissolving the substances named and subsequently a mechanical agent for their transport from one locality to another. It remains but to show under what conditions the substances dissolved are again deposited. These are numerous and various, but to make them fully appreciated it will perhaps be the simplest course to refer to a broad principle universally acknowledged and established. I allude to the degree of force with which atoms are held in combination and especially to the difference in force by which a second atom of similar nature to the primary one combined, is retained, thus as an illustration we may take one atom of an earthy base or oxide, which may be Lime—*i. e.* oxide of calcium, now if this atom of base meet with an atom of carbonic acid, they will directly combine forming one atom of the salt we commonly term chalk or more correctly carbonate of lime,

and the atom of base will hold this atom of acid with very considerable force, in fact nothing short of a stronger chemical affinity or a high degree of temperature, can separate this atom of acid from the atom of base, the case however is very different should the salt carbonate of lime combine with a second atom of carbonic acid, so as to become a bi-carbonate of lime, since instead of holding the second atom of carbonic acid with a degree of force equal to that with which the first atom is held, the force is so feeble, that it is liable to be overcome by the slightest change of circumstances, mere evaporation of the watery particles of the fluid in which the bi-carbonate may be is sufficient to cause the separation of the second atom of carbonic acid, and consequently to determine the deposition of the carbonate. The solvent for the carbonate being the second atom of carbonic acid, and as soon as this is evolved there is nothing to prevent the carbonate from returning to its insoluble state and it does so accordingly. In the instance of the substance sent to me for examination, the deposition has been effected by the attraction of a solid causing the liberation of carbonic acid gas. The action, however, in this particular case, does not stop here,—the deposit is continually washed by water containing soluble silicic acid and soluble silicates, these are continually causing a further elimination of carbonic acid; silicates of alkalies and alkaline earths being formed, while the carbonic acid set free either escapes into the atmosphere, or as the case may be seizes any portions of free alkali at hand. It is a familiar fact that when water is artificially impregnated by carbonic acid mere exposure with diminished pressure, allows of the escape of this gas, the escape is more rapid, if the water be poured or allowed to flow, while in contact with the atmosphere and relieved from abnormal pressure. Still more rapid is the effect, if water whether naturally or artificially impregnated with carbonic acid be boiled, and in this last case, if the alkaline earths or iron be in the soluble form as bi-carbonates, they are (during the ebulition) precipitated in the form of carbonates to the bottom of flask or other vessel in which the carbonated water was held. Finally if either naturally or artificially the water is kept under pressure, and the source of the carbonic acid is continually pre-

sent, the water becomes highly impregnated with it, of which fact, the process of soda-water making is a well known illustration; and of the effect of such conditions, where alkaline earths are present, Sir James Murray's *fluid magnesia* and the *fluid carara marble* of several patentees, are again familiar instances. In the formation of these and similar preparations, we do but imitate the beautiful operations of the highest intelligence as seen in the great Laboratory of the world. When streams impregnated strongly with carbonic acid, are confined beneath the surface of the earth, under pressure while at the same time, the walls of the space through which the imprisoned waters flow afford the alkaline earth's silica, &c., taken up and thus produce carbonated waters, petrifying waters, &c., &c., (when the abnormal pressure is removed) according to the nature and quantity of the solids which have been taken up and for a time held in solution. How slight a cause will occasion such waters to deposit a portion of the solids held in solution is evident from the families practice of suspending keys, knives, or indeed any solid into petrifying wells, as they are popularly termed, all which after having remained in these waters for a longer or shorter term, come out incrusted with deposits more or less calcareous or silicious according to the character of the water. In the case of the deposit before us, the solid on which it has occurred, has been proved to be a portion of woody fibre separated probably from the part to which it originally belonged, by the combined effects of moisture, drying unequally, and consequent unequal expansion.

J. E. MAYER.

OBITUARY.

J. Forbes Royle, M. D., F. R. S.

THIS distinguished Botanist died on the 2nd January 1858, at his residence, Acton. He had been unwell for several weeks previously, but his death was sudden at last.

Dr. Royle commenced his career as a pupil of Dr. Anthony Todd Thompson, and was appointed Medical Officer in the Honorable East India Company's Service on the Bengal establishment in 1820, and performed military duty till 1823.

While so employed, Dr. Royle turned his attention to the vegetable products of this vast empire, and having distinguished himself by an accurate acquaintance with Botanic Science in general, he was chosen as the superintendent of the Botanic Garden established by the Government of Sahrempore, at the foot of the Himalayas, a position which gave him the best opportunity of studying the indigenous flora of Hindostan.

Here, under his direction, a number of most important inquiries were carried on, especially with respect to the feasibility of introducing into the more temperate districts of North India, the cultivation of the Chinese tea plant, &c.

In 1832 having spent 12 years in India, he returned to England, that he might publish the results of his investigations.

The "Illustrations of the Botany of the Himalaya Mountains" forms his earliest and most voluminous printed work. It is in two folio volumes, illustrated by coloured plates and was reviewed at length in the 1st volume of this Journal (1834).

Dr. Royle as Secretary for the correspondence relating to the vegetable productions of India (at the East India House) continued to prosecute these enquiries, directing them with vigour and zeal. In this sphere of research Dr. Royle has been worthily succeeded by Dr. J. D. Hooker and Dr. Forbes Watson, and his schemes for the introduction of tea into India have been carried into a most successful practical result, partly by the labours of the enterprising traveller, Mr. Fortune, partly by the able direction of Dr. Jameson, the laborious superintendent of the Tea Farms. Black and green tea are now grown in the Kumaon district, and prepared by Chinese obtained for the purpose. This tea, we believe, is considered quite equal to the best samples of Chinese tea, which, it may one day supersede.

On the question of Cotton cultivation in India, Dr. Royle has

contributed an admirable digest which contains all the information that can be given.

Of late, the materials for the manufacture of paper having become scarce in England, much anxiety was felt as to the substitution of other fibrous material that might be used instead of the linen rags. Dr. Royle in an Essay read before the Society of Arts on the Fibrous Products of India, pointed out that many indigenous plants produced fibres that could be obtained very cheaply, and in almost any quantity. No man has in fact, contributed more to the practical application of Botanic Science, too often a mere closet study, than this lamented Physician, whom we may well regard as an ornament to his profession, being assured that his name will go down in history as that of a benefactor of his species. This language will not seem exaggerated when we consider the vast importance of the inquiries in which he so successfully engaged. With the cultivation of Cotton is connected the question of the American Slave Trade, and the maintenance of our prosperity as a manufacturing people. The production of Tea is a matter of universal interest.

The cheap manufacture of paper is a matter of such world wide importance that it need not be insisted on. Some few years after the establishment of King's College, London, Dr. Royle was called to fill the important office of Professor of Materia Medica elected in 1836, he occupied this chair for twenty years. The weight of his name contributed to raise that institution to the prominent position which it has since held.

In 1837 he published an Essay " On the Antiquity of Hindu Medicine" a work displaying much learning and research.

His extensive knowledge of the Natural History of India made him a valuable contributor to the periodical scientific literature, and he was a contributor to the " Penny Cyclopædia," " Kitto's Dictionary of the Bible" and other works. He took an active interest in promoting a knowledge of the material resources of India, and in 1840 produced a work which perhaps will be read with more interest now than when it was published. " On the Productive Resources of India."

At the Universal Exhibitions of 1851, as well as that of 1855 in Paris, Dr. Royle represented the East India Company, and was engaged in arranging the department of each building that was allotted to India. He evinced the same interest in the Exhibitions of this Presidency, and some valuable "observations on the improvement of the resources of the several districts" will be found in the 18th Vol. of this Journal, p. 64, 1857.

The materials collected at the different Exhibitions are now preserved in a capacious museum, built for the purpose in the premises of Leadenhall Street. Within a few days of his decease, Dr. Royle was actively engaged in the arduous work of classification. These duties occupied so much of his time that he had less opportunity to attend to the labours of his Professorship. During the last two years that he retained this office, his friend Dr. Headland lectured in his stead; and it was not until 1856 that Dr. Royle resigned. He also made use of Dr. Headland in some of his literary labours. He committed to his supervision the editions of his "Manual of Materia Medica," which is much valued by students.

For a short time he held the office of Secretary to the British Association for the advancement of science. He took an active interest in the development of the plan of the great Exhibition of 1851, and the success which attended the Exhibition of the department of Indian Products was due in a great measure to his efforts. He was a fellow of the Royal, Linnæan and Geological Societies, and at the time of his death held an appointment in connection with the East India Company in London. A subscription is on foot to place a bust of him in the Hall of King's College, London.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

[Under the title of "*Proceedings*" it has been hitherto our custom to publish the abstract of those of the Madras Literary Society, but, as it is desirable to have grouped together in one volume on account of the business of the various Scientific Societies at the Presidency, we have determined to include, under the title above, such details, as to all of them, as may be deemed worthy of permanent record. The Literary Society, the Agri-Horticultural Society and the Photographic Society will thus, all together, find a place in our Journal, and we trust that the record of their Proceedings may be both interesting and instructive.]—ED. M. J. L. S.

The Managing Committee of the MADRAS LITERARY SOCIETY *and Auxiliary of the Royal Asiatic Society, on Thursday evening, 8th April* 1858.

The usual statement of the Society's Funds was read and passed.

Mr. Breeks having quitted Madras, Major W. J. Wilson, and H. B. Montgomery, Esq., M. D., were elected Joint Secretaries—the latter to have charge of the Department connected with the Journal.

A letter dated 15th March 1858 from a subscriber at Ongole was read, this letter points out an apparent error in Lieut. Hawkes' Paper on Oils published in the last Number of the Journal. A reference was made to Mr. Hawkes, who requests that the Table of Exports at page 56 may be corrected by the omission of several redundant figures which have crept in after the correction of the proof.

The necessary correction will be made in the Table of Errata in the forthcoming Number of the Journal.*

The following letter from Dr. Cornish, Civil Surgeon at Coimbatore was also read.

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* Vide Table of Errata in No. V. Vol. III.

Coimbatore, 17*th March*, 1858.

To the Editor of the Madras Journal of Literature and Science.

Sir,—I have just perused with much pleasure in the last Number of your Journal, an interesting description of the crystalline limestone of Coimbatore, by H. F. Blanford, Esq., of the Geological Survey of India. Mr. Blanford's introductory remarks would lead to the supposition that the discovery of the formation in question had been made, in the first instance, by Dr. Cleghorn and Captain Francis, the District Engineer, but such was not really the case. The credit of the discovery, if there be any, belongs to A. D. Ross, Esq., Engineer No. 1 District, Madras Railway and myself.

Early in June 1857, Mr. Ross happened to mention to me that the Natives employed on the Railway were in the habit of burning a curious looking stone in the neighbourhood, for chunam to mix with their betel nut, and, at my request, Mr. Ross was good enough to procure me a specimen of the stone, which I at once recognised as a crystalline marble.

A few days after this I examined the locality where the stone was found, accompanied by Mr. Ross. We traced the band of crystalline limestone from the point stated by Mr. Blanford to the edge of the Walior jungle, a distance of seven or eight miles, and on Mr. Blanford's subsequent visit here I accompanied him and pointed out the position of the limestone band.

Dr. Cleghorn and Captain Francis some weeks after my examination accompanied Mr. Ross along the Railway works to the Walior jungles, and the limestone in question was then pointed out to them, in situ, by Mr. Ross.

At the time of discovery specimens of the marbles were submitted by me to the inspection of the Collector E. B. Thomas, Esq., and Captain Francis.

In justice to Mr. Ross and myself I mention these particulars; Mr. Blanford was doubtless unacquainted with them, or, as he attaches so much importance to the discovery, I am sure he would have given us the credit of being the first to recognize the value of the limestone.

It was my intention at the time to have written a short description of the discovery, but Mr. Blanford's subsequent visit to the neighbourhood led me to abandon the plan, as I felt certain that his account would be in every way more trustworthy than mine, from inexperience in geological description could be.

It is a curious circumstance that a prominent rock of this nature should have been passed by, for so many years unobserved. The Natives knew it practically as a limestone, from the fact of their using it for betel chunam, but none of the European residents, past or present, seem to have had the faintest idea that marble quarries of unlimited extent were to be found within 4 miles of Coimbatore, and within 300 yards of the Madras Railway.

Mr. Ross had been using the stone largely for piers and abutments of bridges on the line of Railway previous to my superficial survey of the locality and before he had asked my opinion as to its nature and composition.

Mr. Ross stated that the Masons were much pleased with the stone ; it was easily quarried and the labor of pointing it contrasted very favorably with that of the gneiss and schistose rocks in the neighbourhood.

I can corroborate all that Mr. Blanford has stated as to the economic value of this crystalline limestone. I fear however, from the coarse crystallization of its structure that it will be difficult to work it for polished slabs.

My friend H. E. Sullivan, Esq. has attempted to polish a few specimens, but it does not work very smoothly.

I am in hopes however that a finer grained stone may be found on careful examination.

On my first visit to the locality I picked up a fragment of white marble, totally differing from the common pink and grey varieties described by Mr. Blanford.

It was very compact, and dense in structure, resembling pure statuary marble, only that it had coursing through it greenish veins of some talcy mineral. I have not been able to meet with this variety since, but it is doubtless to be found on more careful investigation.

This was the most promising of any specimen, and appeared to be admirably suited for ornamental work requiring a high polish.

In conclusion, I may mention that since Mr. Blanford's visit to this neighbourhood, a continuation of this limestone band has been observed by my friend Mr. Ross, some miles to the West of Paulghaut, in a railway cutting.

I am, Sir,

Your obedient servant,

(Signed) W. R. Cornish,

Civil Surgeon.

Mr. Elliot observed that he had received a letter from Dr. Cleghorn within the last few days in which the justice of Mr. Cornish's claim in behalf of himself and Mr. Ross to the first discovery of the limestone was fully admitted, Dr. C. having merely sent the specimens of the rock pointed out to him by Mr. Ross to Mr. Blanford with a view of attracting his attention to the subject.

Mr. Elliot brought a paper on the Syrian and Jewish copper plates of Malabar referring to the previous discussions on these documents in a former Volume of the Journal, and which had been forwarded to him by Mr Collett, from Kokel Kelloo Nair, Moonsiff of Calicut. This paper takes a view differing in many respects from the interpretation of former writers on the subject and assigns to the Plates a date considerably earlier than they have hitherto supposed to be entitled to, founded on certain astronomical data contained in the documents themselves.

The paper is very remarkable as the production of an intelligent and well informed native gentlemen who has had few advantages for acquiring an English education, and who has entered on the subject in the spirit of European criticism. It was referred to the Committee of Papers.

A Vocabulary of the Kotars of the Neilgherry Hills was also read, it is the production of the Revd. F. Metz, whose Toda Vocabulary has already appeared in the pages of the Journal.

The Committee acknowledge with thanks the receipt of the following books.

From the Chief Secretary.

Memorandum on the Pauchontee or Indian Gutta Tree, by Dr. H. F. Cleghorn.

Translation of Dr. W. C. Maclean's Hindustani paper on Small Pox, by Dr. J. Shortt.

From the Author.

Hir et Ranjhan, Legende de Penjab, par Monsieur Garcin de Tassy.

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Society held at the Club House, on Thursday the* 13*th May* 1858, *at* ¾ *past* 6 *o'clock*, P. M.

PRESENT.

The Hon'ble Walter Elliott, Esq., *Chairman.*

E. Maltby, Esq.
R. Burgass, Esq.
Captain G. Winscom.
H. B. Montgomery, Esq., M. D.
W. C. Maclean, Esq., M. D.
M. Norman, Esq.
W. J. Wilson, Esq., *Secretary.*

The Secretary laid before the Meeting the usual monthly statement of the Society's Funds prepared up to the 13th Instant.

Resolved, that the foregoing statement is satisfactory and be passed.

Read the following Extract from Minutes of Consultation.

No. 539.

Public Department.

Extract from the Minutes of Consultation under date the 6th May 1858.

Read the following letter from W. J. Wilson, Esq., Secretary to the Madras Literary Society, to the Chief Secretary to Government, Fort Saint George, dated 1st May, 1858.

SIR,—I am directed by the Chairman and Managing Committee of the Madras Literary Society to forward an Extract from a letter to the address of the Honorable Mr. Elliot, from the Messrs. Schlagentweit of Berlin, and to say, that they consider the proposition

therein contained to be one in every way deserving the consideration of Government.

I have also the honor to forward herewith a specimen of a Santal Head, the execution of which is excellent and highly characteristic, and to observe that the cost compared with the value and interest attaching to such a collection is very moderate; the whole outlay on the 250 heads probably not much exceeding two thousand Rupees.

Extract.

Our collections are now at Berlin where, with the Court's consent, they were brought for being examined and filled up.

A complete set will then be returned to England; the rest is to form a special Indian Museum here. As one of the materials which may perhaps be of some special interest to you, I mention our collection of Ethnographical heads about 250, which are made in copper by galvano plastic, and which have been particularly well received by Baron Humboldt.

If you should find it proper, I would request you to propose to the Government of Madras to order a set for your Museum.

The Government will take one set of the collection of Ethnographical heads made by Messrs. Schlagentweit, for the Madras Central Museum, if the Madras Literary Society will obligingly arrange for getting them out.

(True Extract and Copies.)

(Signed) T. PYCROFT,
Chief Secretary.

Resolved, that the decision of Government be communicated to the Messrs. Schlagentweit by the Secretary, Mr. Elliot also announced his intention of writing to these gentlemen respecting the arrangements for the transmission of the heads.

Read letter from Mr. Bayley regretting that he had been unable from indisposition to submit his report on the system proposed by the Messrs. Schlagentweit for rendering the Indian vernaculars into Roman characters which had been referred to him, and sug-

gesting that a Committee should be appointed to consider the general subject.

Resolved, that the Honorable Mr. Elliot and Messrs. Bayley and Norman do form a Committee to report on a uniform system of rendering into Roman characters the Hindostanee, Tamil and Teloogoo vernaculars.

Read a letter from Mr. H. F. Blanford submitted through Mr. Brooke Cunliffe, forwarding a memorandum on the geological age of the sandstones containing fossil wood at Trivikeri near Pondicherry.

The country around Trivikeri consists of a coarse sandstone containing the well known remains of large trunks of fossil trees, to the westward of which the primitive gneiss formation of the Peninsula appears, and to the east extensive cretaceous beds with numerous remains of ammonites and other chambered shells which stretch for some distance towards the sea, after which the sandstone again appears and continues until covered by the alluvial formation of the valley of the Tembakam-nala which reaches to the sea-shore at Pondicherry.

It has hitherto been supposed that the cretaceous beds rested upon the sandstone formation, and where the latter was wanting directly on the gneiss, and this opinion has been maintained by Mr. Heslop in the geological transactions, and by Mr. A. Schlagentweit in one of his memoirs on the Magnetic Survey. Mr. Blanford, however, in examining some very well defined sections of the sandstone rocks in deep gullies cut by the supplying streams of the Usatari tank four miles to the east of Pondicherry, observed clear indications of cretaceous fossils underlying the sandstone, and being thus led to prosecute his researches into the subject perceived that the Usatari sandstone beds, instead of being under the cretaceous rocks, rest very unconformably upon them. Guided by the light thrown on the investigation of this fact, he instituted a careful comparison between the formations at Trivikeri and those at Usatari; and has come to the conclusion, on grounds which appear incontrovertible, that the Trivikeri sandstones are identical with those at Usatari, therefore newer than the cretaceous beds and unconformable to them.

The reading of this paper which was accompanied by a sketch map and section of the locality, excited much interest. It appears in this number of the Society's Journal.

Read the following letter from the Secretary to the Club together with Extracts from the Proceedings of the Sub-Committee thereof.

14*th April.*

The Secretary to the Club presents his compliments to the Secretary of the Literary Society and forwards herewith an Extract from the Proceedings of the Sub-Committee which he requests may be submitted to the Members of the Society at their next meeting.

By order.

(Signed) G. TALBOT,

Offg. Secretary.

Extract from the Proceedings of the Sub-Committee dated 12*th April* 1858.

Proposed by Mr. Burgass and seconded by Captain Hope, that application be made to the Literary Society that the Madras Club be allowed to subscribe, paying a fourfold subscription, thereby receiving a proportionate number of books.

The Committee engaging the books shall be faithfully returned at the prescribed period, and further that they shall not be removed from the Library.

Magazines and Serials will not be required. (Carried).

Resolved, that Mr. Burgass in communication with the Secretary to the Literary Society and the Secretary to the Club do arrange the conditions on which it is proposed that the books are to be supplied to the Club.

Dr. Montgomery laid the drawing of a Mango stone before the Committee in which the process of germination had commenced, and proceeded to some extent before it fell from the tree. (This will appear in the next No. of the Journal.)

The Committee acknowledge with thanks the receipt of the following books, &c.

From the Chief Secretary.

Indian Journal of Arts, Science, &c.

Deaths at Madras during 1855.

Papers relative to the colonization of the Himalaya Mountains.
Meteorological observations at Dodabetta.

Walter Elliot, *Chairman.* W. J. Wilson, *Secretary.*

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Society held at the Club House, on Thursday the* 8*th July* 1858, *at half past-6 o'clock,* P. M.

PRESENT.

The Hon'ble Walter Elliot, Esq., *Chairman.*

The Hon'ble W. A. Morehead, Esq.
R. Burgass, Esq.
M. Norman, Esq.
Captain G. Winscom,
Major W. J. Wilson, *Secretary.*

The Secretary laid before the Meeting the usual monthly statement, prepared up to the 8th Instant.

Resolved, that the statement is satisfactory and be passed.

Resolved, that W. Hudleston, Esq., be appointed a member of the Managing Committee, and Secretary in lieu of Major W. J. Wilson, who has resigned the Secretaryship.

Resolved, that G. F. Fullerton, Esq. be appointed an acting member of the Managing Committee during the absence of W. H. Bayley, Esq.

A curiously shaped ancient spear head was exhibited by Mr. Elliot to the Meeting which had been found at a village not far from the Red Hills. It is of copper with the figure of a Lotus on one side, and probably belongs to the time of the Curumbars, the ancient inhabitants of the Carnatic who had their principal seat at Pural in the same neighbourhood.

Mr. Elliot also exhibited some specimens of Plumbago received from Mr. Storey at Palamcottah, who described them as having been found by Captain Boswell, of the 52nd Regiment, in the Hills at Paparassam where it occurs in considerable quantities.

It was resolved to communicate the specimens to Mr. Wall.

Walter Elliot, *Chairman.* W. J. Wilson, *Secretary.*

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Society held at the Club House, on Thursday the* 12*th August* 1858, *at half-past* 6 *o'clock* P. M.

PRESENT.

The Hon'ble Walter Elliot, Esq., *Chairman.*

E. Maltby, Esq.
M. Norman, Esq.
Colonel F. C. Cotton.
Captain G. Winscom,
R. Burgass, Esq.
G. F. Fullerton, Esq.

The usual monthly statement of the Society's Funds was read and passed.

A copy of the new Catalogue was laid on the table. The manner in which it was got up was approved, and the execution was considered creditable to all concerned.

Resolved, that two short notices be printed, one requesting that all applications for Books may describe the works in the exact terms of the new Catalogue, or that the page may be specified, and the other requesting that gentlemen will have the goodness to look over their books and return all such as belong to the Society which may have been in their possession upwards of 2 months.

Walter Elliot, *Chairman.*
H. Hudleston, *Secretary.*

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY *and Auxiliary of the Royal Asiatic Society, held at the Club House on Thursday the* 9*th September* 1858, *at half-past* 5 *o'clock*, P. M.

PRESENT.

The Hon'ble Walter Elliot, Esq., *Chairman.*

E. Maltby, Esq.
G. F. Fullerton, Esq.
H. B. Montgomery, Esq., M. D.
W. Hudleston, Esq., *Secy.*

The Secretary laid before the Meeting the usual monthly statement of the Society's Funds, prepared up to 9th instant.

Resolved, that the statement is satisfactory and be passed.

Resolved, that measures be taken by the Secretary regarding arrears of subscription to the Journal.

Resolved that a present of one hundred Rupees be made to Mr. Rozario, the Sub Librarian, as a remuneration for the trouble taken by him, at his leisure hours in the compilation of the new Catalogue.

Read a paper from Mr. Walhouse, submitted by the Honorable Walter Elliot, Esq., entitled "Notes Antiquarian and Mythical," which was transferred to the Sub-Committee on papers.

The Committee acknowledge with thanks the following books received.

From the Chief Secretary.

Indian Official Thesaurus—Introductory to Annals of Indian Administration.

Annals of Indian Administration, parts 3, 4, 5, 6 and 7.

Madras Exhibition of 1859—Of the Raw Products of Southern India.

Madras Exhibition of 1857—Report from the Local Committees.

Walter Elliot, *Chairman.* W. Hudleston, *Secretary.*

Agri-Horticultural Society.

The usual Monthly Meeting of the Committee was held in the Society's Gardens, on Wednesday, 3rd *March* 1858, *at half-past* 6 A. M.

Present:

The Hon'ble W. Elliot, Esq., *President.*
S. D. Birch, Esq.
H. F. C. Cleghorn, Esq., M. D.
J. T. Maclagan, Esq., *Secretary.*

The Minutes of last Meeting having been confirmed, the Secretary reported that a Native named Murrayen to whom the first prize for vegetables exhibited by Market Gardeners, and a prize for grapes were awarded, now appears to have no garden, but to be merely a retailer of vegetables; and it was resolved that in future years, all such intending competitors must intimate their intention to the Superintendent at least three days before the show, that the Committee may be satisfied for their being Market

Gardeners, and of the vegetables exhibited having been actually grown in their own gardens.

Read letter from R. B. Bell, Esq., suggesting that the Society should prepare a Digest of the various Reports upon Produce Cultivation in their possession, and that they should take measures to test the system of growing Cotton under the influence of irrigation.

Resolved, that the Secretary be instructed to thank Mr. Bell for his suggestion, and to state that the Records of the Society do not at present contain sufficient information to enable them to prepare a useful Manual, but that any important facts brought to their knowledge, will be from time to time communicated to the Public through the medium of the Scientific Journals. The subject of growing Cotton under irrigation has recently been referred by Government to various Societies and individuals, and the Committee will endeavour to procure a copy of all the information thus acquired.

The list of flowers and vegetable seeds for the present year, were carefully revised, and many novelties introduced including tubers of *Dioscoria Batatas* amongst vegetables, and a large number of Tropical Flowers from California Mexico.

The Meeting then adjourned.

J. T. Maclagan, *Secy.* Walter Elliot, *President.*

In the months of April and May no meetings were held.

The usual Monthly Meeting of the Committee was held in the Society's Gardens, on Wednesday, June 9th, 1858, *at half-past* 6 A. M.

PRESENT.

The Honorable Walter Elliot, Esq., *President.*

C. Dale, Esq.

H. B. Montgomery, Esq., M. D., *Secretary.*

It was intimated by the President that Dr. Montgomery was on the 5th ultimo elected Secretary to the Society, vice J. T. Maclagan, Esq. who resigned that appointment.

Received Extract Minutes Consultation No. 556 approving this appointment.

The Secretary submits 10 copies of Dr. Cleghorn's Memorandum upon the Pauchontee, or Indian Gutta Percha Tree.

Ordered, that any member of the Committee desiring a copy be furnished with one. Two copies to be placed for record in the office of the Society. Also Drs. Hooker's and Thompson's Flora Indica. Also the reports of the Commissioners of Patents for 1855 (Section Agriculture), all the foregoing have been received from Goverment.

Resolved, that consequent on the return to Europe of R. O. Campbell, Esq., and the retirement from the Society of H. Forbes, Esq. C. S., and Surgeon James Sanderson, the following Gentlemen be elected members of the General Committee.

J. Vans Agnew, Esq.
Colonel Colbeck.
Andrew J. Scott, Esq., M. D.

Read letter from Messrs. Pharoah and Co. tendering for sale a sample of Indian Rubber tubing.

Resolved, that Messrs. Pharoah and Co. be informed that the Society does not require the tubing not having any Engine to which to attach it, and considering that it would not be found generally useful in the Garden.

The monthly accounts having been examined, and as it appears to the Committee that it is not now required to have more than 2 pairs of bullocks, it was unanimously resolved, that one pair of bullocks be sent to the next Periodical sale of Messrs. Waller and Co. to be disposed of outright.

The Secretary submits to the Committee the Ground plan of the new plot of ground adjoining the Cathedral, and directs attention to the condition of the wells in that ground.

There are at present three wells in the space marked on the plan as Nos. 1, 2 and 3 respectively, the first two of these are brackish and in indifferent repair.

The Committee decide that a trial well should be sunk in the two positions now indicated on the plan by the * * Should good water be obtained in either of those places, tenders are to be invited for the sinking of one well 12 feet in diameter and 30 feet deep, and that subsequently the wells No. 1 and 2 be filled in and the ground levelled over them.

Resolved, that the future meetings of the General Committee be held on the 1st Wednesday of each month, and that the members be requested to attend with as great regularity as their other engagements will allow.

The Secretary is requested to draw up a memorandum relative to the best means of labelling the more conspicuous plants in the Gardens, as suggested in his verbal communication to the Committee this day.

The President brings to the notice of the Committee a private letter from Major General Johnson, Commanding Tonghoo, intimating the arrival of two "Ward's cases" and a packet of seeds, which are much prized.

A moiety of the latter has been presented to the Revd. Dr. Mason, a Missionary and distinguished Naturalist in the Tenasserim Provinces.

Resolved, that the Secretary be instructed to open correspondence with the Revd. Dr. Mason with a view to an interchange of seeds with that gentleman, which are to be sent occasionally, when any are available for that purpose.

That on the present occasion the seeds named in the letter to address be forwarded

The meeting then adjourned.

Walter Elliot, *President*. Howard B. Montgomery, M. D., *Secy.*

The usual Monthly Meeting was held on July 21st at half-past 6 o'clock A. M.

PRESENT.

J. V. Agnew, Esq.	Lieut. Col. Colbeck.
Lieut. Col. McCally.	H. B. Montgomery, Esq., *Secy.*

There not being a quorum for the despatch of business, and the meeting was occupied for some time in the perusal and consideration of certain letters and papers relative to the proposal of the Manchester Cotton Association to send a quantity of New Orleans Cotton seed to India for experimental growth. The papers relative to this subject will appear at length in the next number of

this Journal. It was determined that unless in case of urgent business, no meetings of the Committee were to take place during the months of August and September.

Proceedings of the Photographic Society.

A Meeting of the Photographic Society *was held at the School of Arts, on Thursday, 4th March,* 1858.

Present.

Hon'ble Walter Elliot, Esq., in the chair.

Messrs. Mitchell,	Messrs. Underwood,
,, Scott,	,, Neill,
,, Hunter,	,, Lafond, and
,, Cleghorn,	,, Duff.

The following gentlemen were elected members, Messrs. Cole, Paton and Nichols.

The Secretary laid on the table the collection of pictures printed by Mr. Sutton for distribution amongst the subscribers of 1856-57. The subjects are Pagodas on the Sevagunga Hill, view of the Parthasaratha Pagoda and Tank at Triplicane, and Goprum of the Ulsoor Pagoda from negatives, by Lieut. Mitchell. Old Banian and Date trees on the bund of the Hullahede tank, and ship "Duke of Wellington" in the Plymouth Dock from negatives by Captain Tripe, and a group of palmyra trees by Mr. Crake. The number of prints for distribution is 600, which will admit of nearly 6 being given to each subscriber.

Resolved, that the thanks of the Society be given to Messrs. Mitchell, Tripe and Crake for kindly placing their negatives at the disposal of the Society. It is to be regretted that the prints do not come up to the expectations that were entertained from the reputation of the Printer to whom they were entrusted.

Resolved, that the prints be distributed as soon as possible. Subscribers in Madras being requested to send to the School of Arts for their copies, and up-country Subscribers to make arrangements with their Agents for having them packed and despatched to their address.

Mr. Underwood mentioned to the meeting that he has for a considerable period been endeavouring to make an iodizing mixture for collodion, suited to the climate of Madras, and that he had reason to believe he had succeeded both with positive and negative collodion. Collodion iodized with it whether Horn's, Thomas's, Bertch, or made by himself, seemed to answer equally well. For positives the collodion should be dark, for negatives lemon color. The first is obtained either by keeping iodized collodion some time or what appears preferable mixing old collodion with collodion freshly iodized half and half, or one-third according to the age of the old collodion—the guide is not to mix enough of old collodion to make the film of the collodion tender. The color of freshly mixed iodized negative collodion should be removed either by silver or zinc. Mr. Underwood states, that the unsatisfactory results of collodion received from Europe is consequent upon the difference of the light in India. In England the shadows are light and the sun shining on an object illumines it, but in this country, the shadows are black and form a hard dark outline, while at the same time the object illumined by the sun has a dazzling brightness, consequently those parts are over exposed before parts in shadow are depicted on the collodion plate. A sacrifice must therefore be made, and the result is an unsatisfactory picture. Mr. Underwood exhibited three portraits by Mr. Nicholas which were taken with the collodion iodized with the mixture above mentioned. One of the Lord Bishop, one of Mr. Cherry, and one of Captain Nicholas. They were pronounced to be excellent portraits and very satisfactory Photographs ; the one of the Bishop appeared to exhibit the half tones in the most satisfactory manner, and the members present were of opinion that the whites were excellent in all while the blacks were clear, that there was a degree of brilliancy in the pictures, and that the half tones were well preserved.

A small paper positive printed from a collodion negative of Christ's Church taken by Mr. Nicholas was satisfactory, as in it the lights were excellent, while the parts of the building in shadow were well pourtrayed. Mr. Underwood observed it was satisfactory to learn that the end desired was considered to have been attained in the pictures laid before the meeting, and stated that

further trials would be made on a larger scale with collodion negatives, and the result notified to the Society, he mentioned that above 200 positive portraits had been taken by Mr. Nicholas with collodion iodized with the mixture above referred to, and the result was so satisfactory that he used no other.

Dr. Neil presented to the Society a number of Photographs of very great merit by several European Photographers. Amongst them were several prints from collodion negatives by F. Maxwell Lyte, remarkable for their clearness and accuracy of focusing as well as for their delicacy of ærial effect and clearness of printing. The valley of Parguerls represents a village picturesquely situated at the gorge of a hill with a very delicately graduated distance to the left, and a bold mass of broken rocky crags on the right. The field in the foreground is a little flat, and the gable end of the cottage too brilliant a spot of white to please the eye of a painter. The bridge of Orthee is a picturesque subject with a pleasing arrangement of light and shade, and a good foreground of broken rocks overhanging a placid shallow stream. The valley of Argeles is a representation of flat meadow land traversed obliquely by low hedges and terminated in the distance by fine hills brightly illumined by a mid-Sunday. A bridge of one arch overhung with ivy and spanning a broad deep river is an exquisite piece of Photography, the windings of the river with the distant hills, part of a house and garden, with a waterfall seen below the arch, and delicately reflected in the deep pool, make a most pleasing picture, the toning, manipulation and focusing of which are all excellent.

The Chateau Dr. Arras is a picturesque subject representing a ruined mansion on the brow of a woody hill with a range of snow clad mountains in the distance, and bold peaks in shadow rising in the mid distance, the effect of a cloudy day with a watery sky is well rendered, but the toning of the picture is a little inky. Some calotypes by H. Taylor are picturesque. The best is a cottage at Farucombe. A Talbotype of Caswell Bay Glamorgonshire gives an excellent idea of the Geological characters of the rocks in the vicinity. This picture however has not been sufficiently freed from Hyposulphite. An interesting picture, by R. Fenton of the Council of War held on the morning of the taking of the Mamelon re-

presents Lord Raglan, Omer Pacha and General Pellisier seated on Camp Chairs, at a small table, outside of a door way.

Two large views in the gardens at Hutton in Suffolk are beautiful as Photographs, picturesque as landscape studies, and valuable on account of their clear focusing and botanical accuracy. These are about the best Photographs of Trees hitherto seen in Madras.

Resolved, that the best thanks of the Society be given to Dr. Neill, for his valuable donation.

Lieut. Mitchell, exhibited a number of large negatives on paper, views lately taken of the monolithic temples, carved rocks, and cave temples at Mahavellpooram, or the 7 pagodas, these were exceedingly clearly brought out and delicate in the half tints. It was thought that they would yield fine impressions. The Secretary intimated that it would soon be necessary to make arrangements for printing the Photographs for distribution amongst the subscribers of the second year. Mr. Crake had kindly offered some of his negatives to be printed from, and other Members were invited to do the same.

Mr. Elliot suggested that Portraits of some well known members of Society might prove more acceptable to many members than landscapes, and it was resolved that the Council should take steps to procure some negatives if possible.

The Secretary read a communication from Mr. Lafond on the subject of an explosion from gun cotton, which occurred in his practice. Mr. Lafond had made some gun cotton, which was insoluble, following the recommendation of Mr. Clarke, he placed it in a mortar with the intention of soaking it for a short time in sulphuric acid. But the instant the acid was poured upon the gun cotton a violent explosion ensued from which he received a severe contusion on the forehead, and which might have been attended with more serious consequences.

The ordinary Monthly Meeting of the PHOTOGRAPHIC SOCIETY *took place at the School of Arts, on Thursday the* 1*st April.*

The Hon'ble Mr. Elliot, in the Chair.

The attendance was not so good as usual, owing to some misapprehension as to the day of meeting. Messrs. Duff and G. W. Cole, were proposed and elected members of the Society. The Secretary placed before the meeting positive prints from two negative Collodion portraits of Lord Harris taken by Mr. Nicholas with the assistance of some members of the Council, and intended for distribution along with the prints to which members become entitled who have paid up their 2nd years' subscription. They were pronounced to be faithful likenesses of his Lordship, and will no doubt, be much appreciated. It is hoped, that following out Mr. Elliot's suggestion, portraits of other distinguished members of Madras Society may be secured by the Council for distribution. Those members who have not paid the second years' subscription amounting to about 40, should lose no time in doing so; otherwise they will not be entitled to the above mentioned prints, and must of course cease to be considered members of the Society. Subscriptions are payable either to the Honorary Secretary or to Messrs. Parry and Co.

The Secretary announced that arrangements have been made with Dr. Neill, who has kindly placed any of his negatives at the disposal of the Society, to have two of his lists printed for distribution either in London or Paris, and it is hoped, he may succeed in having them executed in better style than those now being distributed. Dr. Neill has also kindly undertaken to endeavour to procure for the Society a negative of the late General Neill. A letter was read from Captain A. N. Scott of the Artillery, offering a couple of negatives to be printed for distribution, and it was unanimously agreed to accept his kind offer. The subjects are the caves of Ellora and the Tombs of Golconda.

A Committee consisting of Messrs. Underwood, Mitchell and Scott, was appointed to make arrangements for the approaching Exhibition which is to take place at the School of Arts in the beginning of nexth month, and the Council takes this opportunity of

reminding up country members of it, and of requesting them to send their contributions with as little delay as possible. Any members wishing to contribute, should forward their portions so as to reach the Honorary Secretary before the end of the present month at latest. There must now be a larger number of Photographists scattered over the country, and any contributions whether from members or others unconnected with the Society, will be thankfully received

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The Annual Meeting of the Photographic Society, *took place on Thursday, the* 6*th May, at the School of Arts.*

The Right Hon'ble Lord Harris in the Chair.

Present.

The Hon'ble W. Elliot, Esq.	Dr. Duff.
Captain Tripe,	Captain Barwise.
W. E. Underwood, Esq.	Colonel Browne.
Lieutenant Mitchell.	Messrs. Paton, Cole and Scott.

The Secretary laid a statement of the Funds before the Meeting and read the following

Report.

At the conclusion of another year of the Photographic Society's existence, the Council beg to submit a statement of the Funds as they at present stand, from which it will be seen that there is a balance in favour of the Society of Rs. 85 exclusive of a Government Promissory Note for Rs. 1000. Notwithstanding, they regret to observe, that no fewer than 50 out of 120 members have failed to pay their Annual Subscription—*some of these, however, have left the country.*

The monthly meetings have not during the past year been so fully attended as at first, nor have so many original communications been made as could have been desired. The cause of this may in a great measure be attributed to the disturbed state of the country during that period, which has not only distracted attention from such pursuits, but has also actually prevented several of our working members from devoting that time to the art which they

would otherwise have had at their disposal. Some have been, and are still, employed in active service in the North, while even of those resident in Madras, several have been so much occupied by the duties which have devolved upon them in consequence of this state of matters, as to have had very little time at their disposal for any thing else. And if this applies to Madras, it does so in a much greater degree to the other Presidencies, from neither of which have we received any direct contributions to our Annual Exhibition; a large and varied collection however published in the Bombay Amateurs' Journal is to be found in the Exhibition.

An endeavour was made last year to induce the Societies of the sister Presidencies so to fix the time of their respective Exhibitions, as to enable the three Societies to interchange contributions and thus render the Exhibitions more interesting. It is to be regretted that the Bombay Society have never replied to the Secretary's letter. The Bengal Society did so, and promised to consider the subject when arranging about their own Exhibition for this year. They appear to have overlooked the matter, however, for although a requisition has just been received from them soliciting contributions for their Exhibition that is announced to take place next month, they make no allusion to the proposal which was made to them, nor have they sent a single picture for our Exhibition.

In our own Presidency, however, there is every reason to believe that Photographers abound all over the country, and so great is the demand for Photographic chemicals, that Messrs. Flynn and Co. state that they have great difficulty in supplying it. This circumstance alone proves what has been above stated, and considering the many objects of interest to the Photographer in this Presidency, not only as regards Architectural remains and scenery, but also as illustrations of Ethnological questions, considering the great variety of races of the human family, the diversity of their costume and habits, the implements used in their manifold occupations, nearly all so different from what are used in Europe, it must be admitted that circumstances are most favorable to the production of a highly valuable and interesting class of Photographs characteristic of the country and its inhabitants, and it would un-

doubtedly be a matter for much regret were the opportunity lost of taking full advantage of these circumstances.

The existence of a Society such as this for the encouragement of the Photographic art in Madras, is the chief means by which in time these objects may be attained, and it would be a great pity were it allowed to fall to the ground for want of support. The Council therefore take this opportunity of urging the claims of this Society, particularly upon working Photographers. Of the doings of those not resident in Madras scarcely anything is heard, they hope this state of things will not continue, but that every one who uses the Camera will not only become a member of this Society, if not already one, but contribute his mite to establish and maintain the character of Southern India for the encouragement and cultivation of the Art.

The arrangement for procuring prints for distribution to the members of 1856-57, the Council regret to observe, was not so successful as they anticipated: they hope that in future this object of the Society may be more satisfactorily attained. The six negatives placed at their disposal for printing were forwarded to Mr. Sutton who has a good reputation as a Photographic Artist, but the prints received from him in the present instance do not come up to the expectation formed by the Council. They are evidently executed by the development process, which, although it has the advantage of rapidity and economy, (and, it is said, permanence) does not appear to suit all subjects so much as the original method of printing and gives a certain appearance of coarseness which is harsh and unpleasant to the eye. The Council hope to obviate this in future, and will use their best endeavour to have the prints for the next distribution executed in a better style, and more worthy the acceptance of members.

In regard to a room for the meeting of the Society, and where the Library and collection of prints can be kept, a step has been made in the right direction, as a room at the School of Arts has recently been placed at the disposal of the Society by the Superintendent of that Institution; and although there are difficulties in the way of its being made over entirely to the Society with this view, there is every prospect of its being rendered more available

for the purpose than hitherto, and with a little outlay and arrangement, it might be made not only a comfortable place of meeting, but also an interesting resort and rendezvous for Photographers at the Presidency. The funds of the Society being insufficient to enable the Council to secure a room, permanent arrangements are out of the question. The School of Arts being of a kindred character, is certainly the most legitimate institution for the Society to become associated with, and the advantage of their being so, may probably be found reciprocal.

As it will be necessary to determine immediately the number of prints required for distribution to the members for 1857-58, the Council request that those members who have not forwarded their subscriptions for the current year, will be good enough to do so by the 1st of June.

The following Gentlemen were then elected Members of the Society.—The Hon'ble W. A. Morehead, Esq., C. Roberts, Esq., Captain Barwise, Capt. Logan, Dr. Barclay, and Capt. S. Batten. —Captain J. D. Scott and Dr. Duff were elected Members of the Council in room of Mr. Cochrane and Dr. Hunter who have left Madras, the remainder of the Council were re-elected for the ensuing year.

The Photographs intended for Exhibition were displayed, and form a large and varied collection, including both Indian and European subjects. Many of the latter are of very large size and exquisite specimens of the art. These have been almost entirely contributed by J. G. Garrett, Esq., to whom the Society is much indebted for affording them an opportunity of inspecting the works of the best Photographers in Europe, and of seeing what can now be attained by skill and improved means. The views in Switzerland by Bisson Freres, and some groups of Flowers by Beam, attracted special attention. Mr. Garrett also contributed a large collection of Indian Subjects published in the Bombay Amateurs' Journal, and Mr. Underwood a number of admirable stereoscopic views and groups by the best Artists. Among the other contributors of Indian Subjects, are Lieut. Mitchell, Capt. Barwise, Capt. A. N. Scott, Mr. Nicholas, Capt. Buchanan, Mr. Underwood and Dr. Scott.

It was resolved that the Exhibition should be open to the public from Monday the 10th intant, from 7 A. M. till 6 P. M., and continue so during the present month.

The thanks of the Meeting were then voted to the Right Hon'ble the Chairman for his obliging conduct in the Chair.

THE exhibition of the Photographic Society for 1858, greatly disappointed its projectors. Among the very numerous Photographers scattered through the country, only two gentlemen in the Mofussil favored the Society with pictures for Exhibition. The Photographs exhibited, however, proved that the Artists of this Presidency are by no means less skilful manipulators than their brethren of the other Presidencies, and the excellence of their productions only increased the regret that the number of Exhibitors were so small. It is possible that fear of injury or difficulty of transmission may have deterred parties from exhibiting. If this be so, it is to be hoped, that before the exhibition of next year, Photographers in the interior, whether members of the Society or not, will communicate with the Secretary, when it is more than probable that all difficulties in the way of transmission will be removed.

The absence of the productions of Indian Photographers, was however (as far as such a deficiency could be) well made up by the very fine and numerous Photographs: English, French and Roman, placed at the disposal of the Society. Of these some stereoscopic pictures excited universal admiration and appeared to be with the majority, the principal attraction of the Exhibition.

Foremost among the pictures exhibited requiring notice are 25 views 15 x 11 by Lieut. J. Mitchell. These were intended to illustrate the Seven Pagodas so well known as objects of interest. They were admirably executed and are fully equal to any Photographs which have been produced in India, a list of these and the process by which they were taken is given in the Appendix to the Report.

Captain W. Barwise exhibited 42 prints from Collodion negatives, some taken in England, but the majority in Burmah. They

comprised portraits, groups and landscapes of every variety—the two former illustrative of the dress and customs of the Burmese. This gentleman appears to have used an old hypo-bath, the traces imparted by which, in our opinion did any thing but justice to the negatives, most of which must have been very clear, and should have yielded better proofs.

Dr. A. J. Scott exhibited 12 prints about 6 x 7 from waxed paper negatives, consisting of rare trees and views of places well known at the Presidency. These were taken with the anterior lens of a combination which appears scarcely to yield such perfect results as a proper landscape lens. Dr. Scott, we understand, will remedy this, before the next exhibition, and his pictures will then compete with the best.

Captain A. W. Scott exhibited a great frame which contained 24 positives on glass. Single portraits and groups, chiefly of Natives of the various castes found in the Deccan. They were excellently well executed and claimed for Captain S. an honorable place among Photographers. An old Moonshee was recognized by a person who had not seen him for 16 years. Mr. Nicholas exhibited some portraits of ladies and gentlemen, amongst them were two of Lord Harris, one a print, the other a glass positive. These pictures were admirably executed. The pose was good; the figures all in focus and the features, especially the eyes, quite distinct, and well delineated, and with one exception they were free from that common fault of Indian portraits, a rigidity of features which is doubtless caused by the excessive glare to which the situr is usually subjected when pictures are taken out of doors. The portrait of Captain Russell was a brilliant picture, and we think the glass positive of our worthy Governor, one of the best we ever saw. Altogether we should say these were such faithful likenesses as friends would desire to possess.

Some portraits of religious mendicants, were also exhibited by Mr. Nicholas. These were executed with the assistance of Mr. Underwood. These are curious in their way, and the selection of subjects were excellent. One party had a wire passed through his cheeks. Two others had large square iron frames riveted to their necks. The pictures are well executed, and copies are for sale at Mr. Nicholas' Studio.

Captain Buchanan exhibited a print 12 x 10 of Coonoor on the Neilgherries, from a Collodion negative. This is a faithful representation of the place, and a picture which no Amateur need be ashamed to exhibit any where. It is to be hoped that Captain Buchanan, will send a large portfolio of pictures for the next exhibition.

Mr. Garrat exhibited 47 beautiful views and portraits, some from the Bombay Photographic Album, others the work of English, French and Roman Artists, they are all good, and among them were some very superior Photographs. Of the portraits, that of the Metropolitan Bishop of the Syrian Church at Jerusalem printed at Bombay deserves especial notice. Among the European Photographs, were some fine views, admirably executed. The crucifixion by ——— is one of the finest Photographs ever exhibited, and has gained an European reputation. The Baptistry at Canterbury is also an excellent Photograph.

Some large Photographs of fruits and flowers received, as they well deserved marked attention, for they were nature herself, wanting only the colors. Captain Winscom exhibited 14 large views in Rome, including the Coloseum St. Peters, the Vatican, &c. These are by Macpherson, a well known Photographic Artist residing there. They are well executed, but some of the prints have faded considerably, a very common failing in prints taken some years ago. Of late this great defect in Photographic printing has been remedied to a great extent.

Mr. Underwood exhibited 6 views by Le Gray, 5 of these were views of sun and cloud and moving objects, chiefly marine, these are very ambitious attempts, and as specimens of what photography can do in delineating the passing cloud and moving waters they are really wonderful productions. The clouds however have a very thunder stormy appearance and make one instinctively button his coat and think of his umbrella. A Steamer *La Reine Hortense*, by the same artist is a better picture, though by no means so striking.

There is in it however an evident want of flatness of field, the margin of the picture being blurred considerably showing a large amount of spherical aberration in the lens.

Mr. Underwood also exhibited a large collection of stereographs on glass and paper which excited general admiration and attention. The table upon which they were laid was crowded, and many waited a considerable time to obtain a look at them.

The Exhibition was well attended particularly by Natives contrary to expectation. It is singular however, notwithstanding the opening of the Exhibition was announced in the principal local papers, numbers of the European and East Indian community never knew of it until it was closed, many came at the last moment only to feel regret that they had not had more time to examine, certainly the finest collection of Photographs ever seen in Madras.

We would suggest that before the next Exhibition, the Council of the Society communicate with Photographers in the interior and endeavour to induce them to take more interest in, and contribute more liberally to, the coming Exhibition than they have done to the one we have endeavoured to chronicle. When there is so much talent in the country, it is too bad to compel the Council to draw so largely upon foreign aid as they were obliged to do on this occasion.

The propriety of awarding some prizes to the Exhibitors of the best pictures, has, we understand, been under consideration by the Council, but there are some practical difficulties in the way of this. While however the bulk of Photographers in the Presidency consists of Gentlemen Amateurs, we scarcely think that such an inducement as this can be requisite, and we do hope on the part of the public that they will give the community of Madras an opportunity of admiring their works in the ensuing spring.

At the last Meeting of the Society, the Hon'ble Mr. Elliot exhibited some highly interesting views of Lucknow. The name of the Photographer was not stated, but they have evidence of being the work of the same professional Artist, although the printing has not been so carefully done as it might be.

The views are as follows :

No. 1.—Secunder Bagh in which is shown the breach through which the 93rd Highlanders stormed it, and also gate-way by which the 1st Madras Fusiliers entered.

No. 2.—Interior of the Secunder Bagh where 2,000 of the enemy were killed. In this picture quantities of bones and skulls

lie scattered about in the foreground, a vivid memento of the fearful slaughter which took place in this building.

No. 3.—Represents the Chutter Munzil and Farhat Bucks taken from the river. The former is now in use at the General Hospital.

No. 4.—The King's residence in the Kaiser Bagh, a fine specimen of mixed architecture where domes and minarets and fluted Grecian columns are to be seen in juxta position.

No. 5.—Wheeler's position at Cawnpore, the ruins of two large buildings vividly showing the impression made by shot and shell, groups of soldiers in the foreground.

No. 6.—The Bailey guard-gate to the embrasure where the Fusiliers entered the Residency on the 25th September 1857. To the right of the picture is seen a building which was occupied as the Hospital during the latter part of the siege.

No. 7.—View taken from the interior of the Residency, showing the old palace and a portion of the Kaiser Bagh.

No. 8.—View of the Residency from the burial ground, showing the rear of our defences. In the picture is also represented part of the Begum Kotree, where the ladies were during the siege, next to which are the ruins of a house used as a Mess House by the garrison. In the foreground is the spot where the Church stood, not a vestige of which now remains.

No. 9.—View of the Residency taken from the road between the Bailey guard-gate and Furhat Bux.

No. 10.—Ruin of the Residency, and the room in which Sir H. Lawrence was killed.

No. 11.—Represents a panoramic view of Lucknow, taken from the roof of the Kaiser or Bagh, gives the idea of a splendid city, palaces, mospue and minarets interspersed with beautiful gardens, in one of which a battery of Artillery is delineated. The impression given on viewing this picture is that few cities even in Europe could compete with Lucknow in grandeur of effect and architectural beauty.

At a late meeting of the Society, Captain Tripe brought to notice some very interesting facts connected with his experience of the dry collodion process, and he has kindly consented to draw up a short memo. on the subject for publication.

DAILY MEANS.

April 1858.

Date.	Barometer reduced to 32° Faht.	Thermometers. Means. Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·891	83·3	76·9	93·2	77·1	E S E	....	Hazy
2	·874	82·4	75·8	96·5	75·9	E S E	....	Clody.
3				91·9	74·5	E S E	....	
4	·853	82·8	76·7	93·7	78·3	S E	....	Clody.
5	·859	83·5	77·7	93·5	77·4	E S E	....	Hazy
6	·843	84·6	77·3	96·7	78·4	E by S	....	do
7	·806	83·4	77·1	94·6	77·0	E S E	....	Clear.
8	·831	84·1	77·6	95·2	78·2	S E	....	do
9	·822	85·5	78·3	99·9	78·3	S S E	....	do
10				101·7	81·2	S by E	....	
11	·788	87·2	79·8	99·6	82·4	S	....	do
12	·816	86·4	80·6	96·2	82·9	S S E	....	Hazy
13	·816	85·5	79·9	94·9	81·7	S by E	....	Clear.
14	·840	85·2	79·6	94·5	81·4	S E	....	Hazy
15	·872	84·3	78·9	93·6	79·5	S E	....	Clear.
16	·894	84·3	78·7	93·7	78·9	S E	....	Hazy
17				94·6	79·1	E S E	....	
18	·875	85·0	79·0	94·9	78·7	E S E	....	do
19	·857	84·9	78·1	95·0	78·8	E S E	....	do
20	·877	84·9	77·6	96·0	78·9	E S E	....	do
21	·902	83·8	77·2	94·8	76·7	E S E	....	Clear.
22	·875	84·0	77·7	94·2	77·4	S E	....	do
23	·809	84·3	77·5	94·1	77·8	E S E	....	do
24				94·9	79·1	S E	....	
25	·772	85·6	79·1	95·6	80·9	S E	....	Hazy
26	·793	85·9	79·7	95·8	80·9	S E	....	do
27	·814	86·0	79·5	95·8	81·1	E by S	....	Clear.
28	·836	84·4	79·3	88·3	81·9	E N E	0·279	Ovcst.
29	·860	83·3	78·5	93·8	79·0	E	·361	do
30	·831	83·8	79·2	92·4	79·7	E by S	·192	Hazy
31								
Means	29·843	84·6	78·4	95·0	79·1		0·832 Sum	

May 1858.

Date.	Barometer reduced to 30° Faht.	Thermometers. Means. Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1				93·1	80·5	S E	....	
2	29·776	84·3	78·6	94·0	80·0	S E	0·014	Clody
3	·755	81·3	77·4	83·5	80·1	N S	·584	Ovcst.
4	·618	78·9	76·7	81·7	77·7	N	·595	do
5	·729	78·1	75·1	88·8	77·4	S by W	·018	do
6	·720	82·3	78·2	92·9	78·5	S S E	·004	Clody.
7	·693	84·8	79·3	95·2	79·8	S	....	Hazy
8				101·2	81·5	S S E	·779	
9	·733	83·8	78·6	93·7	79·0	?	....	Ovcst.
10	·740	84·4	79·2	98·7	79·2	S by W	....	Hazy
11	·698	85·6	79·1	96·2	80·3	?	....	do
12	·667	85·0	79·1	95·3	81·1	S by E	....	do
13	·663	84·6	78·2	95·4	79·7	S S E	....	Clody.
14	·683	85·1	79·0	94·4	80·3	S S E	....	Hazy
15				99·8	82·1	S S W	....	
16	·702	87·9	77·7	100·8	84·6	?	....	Clody.
17	·677	85·5	77·6	94·5	82·2	S W	·180	Ovcst.
18	·606	83·5	77·3	96·0	83·2	S W	·792	do
19	·619	85·3	76·6	97·6	79·2	?	....	do
20	·671	87·7	76·4	100·1	81·2	W by S	....	Clody.
21	·700	87·2	78·3	100·2	81·1	Anemometer under repair.	....	do
22				100·4	81·3		....	
23	·740	87·5	77·3	103·7	81·3		....	Hazy
24	·765	88·3	78·0	103·9	82·2		....	do
25	·775	88·2	77·7	104·0	83·1		....	do
26	·761	87·2	77·8	101·4	82·1		·068	do
27	·735	85·9	77·1	100·6	80·8		....	Clody.
28	·733	87·0	78·2	100·0	81·5		....	do
29				100·2	81·7		....	
30	·798	87·9	78·4	100·5	82·3		....	do
31	·787	89·2	77·8	103·4	82·3		....	Hazy
Means	29·713	85·2	77·9	97·1	80·9		3·034 Sum	

June 1858.

Date.	Barometer reduced to 32° Faht.	Thermometers. Means. Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·753	88·0	77·1	100·1	81·8	Anemometer under repair.	....	Clear.
2	·711	88·9	78·0	100·5	83·9		0·320	Hazy
3	·727	85·7	78·1	100·8	80·8		....	Clody.
4	·736	86·9	76·8	101·7	80·4		....	do
5				103·2	81·0		....	
6	·701	87·6	76·4	101·4	80·7		....	Hazy
7	·689	87·9	76·1	105·2	79·2		....	Clear.
8	·702	87·4	77·5	101·3	81·4		....	Hazy
9	·710	87·6	78·5	101·8	82·0		....	do
10	·706	89·0	78·5	102·9	82·2		....	Clear.
11	·694	89·2	79·2	102·7	82·7	S by W	....	do
12				106·5	84·5	S	....	
13	·690	89·9	79·4	105·5	83·4	S S W	....	Hazy
14	·724	89·7	79·6	104·5	83·6	S by W	....	do
15	·746	85·9	78·9	95·1	82·3	S S W	....	Ovcst.
16	·749	86·4	78·2	100·3	82·8	S S W	....	do
17	·739	85·2	78·2	98·6	80·7	S W	·937	do
18	·711	85·1	77·8	98·6	79·9	S W	·260	Clody.
19				97·8	81·5	S W	....	
20	·700	87·3	77·8	101·0	82·1	W S W	·010	do
21	·688	86·9	77·8	100·9	82·5	W S W	·106	do
22	·646	86·8	77·1	98·4	81·9	W	....	Ovcst.
23	·671	86·7	77·0	101·8	80·6	S	....	Clody.
24	·725	87·4	77·2	102·9	80·8	S by W	....	Hazy
25	·765	88·2	76·3	102·5	83·4	S W	....	do
26				96·7	80·3	?	....	
27	776	87·5	78·2	97·7	81·5	?	....	do
28	·764	88·8	79·1	104·8	83·4	S E	....	Clody.
29	·771	88·5	78·9	102·4	82·7	S by W	....	do
30	·769	88·2	78·8	99·5	82·5	W S W	....	Hazy
31								
Means	29·722	87·6	77·9	101·4	81·9		1·633 Sum	

July 1858.

Date.	Barometer	Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·754	87·0	78·3	102·4	80·2	S	....	Hazy
2	·742	84·0	76·7	97·7	77·9	S S W	0·052	Ovcst.
3				93·5	76·7	S W	·045	
4	·732	84·9	77·9	97·7	76·6	S	·810	do
5	·684	83·9	77·4	97·0	78·5	W S W	·710	Clody.
6	·659	83·4	77·0	92·7	79·7	W S W	....	Ovcst.
7	·641	83·1	76·2	94·9	80·0	W	....	do
8	·656	86·3	77·3	98·9	80·9	W S W	....	Clody.
9	·696	85·7	77·4	100·9	81·1	W S W	....	do
10				98·2	78·8	W	·040	
11	·690	86·0	77·8	95·9	80·6	S W	....	Ovcst.
12	·680	85·6	77·8	95·1	81·4	W S W	....	do
13	·698	87·3	76·4	97·3	82·7	W S W	·175	do
14	·733	84·2	77·1	97·5	80·5	S W	·235	do
15	·764	82·6	76·2	96·8	79·2	S S W	·014	do
16	·775	83·7	76·5	91·0	80·2	?	....	do
17				95·2	81·4	?	....	
18	·762	86·2	76·7	98·5	82·6	W	....	do
19	·729	87·1	76·9	96·8	82·5	W	·027	do
20	·743	87·3	77·0	100·7	82·6	W S W	....	Clody.
21	·784	87·1	78·2	101·2	81·1	S S W	....	Hazy
22	·817	87·3	78·2	98·6	81·8	S	....	Clody.
23	·794	86·3	77·8	99·3	81·5	W S W	·070	Ovcst.
24				101·8	81·1	W S W	·006	
25	·734	88·2	76·9	102·2	82·6	W S W	·010	do
26	·755	87·3	77·9	101·3	80·6	S W	....	Hazy
27	·784	85·7	78·7	97·6	81·2	S	·212	Ovcst.
28	·782	83·4	77·6	95·3	78·5	S S W	·570	do
29	·766	83·9	78·3	96·6	80·1	S S W	....	do
30	·781	82·4	78·4	89·5	80·8	?	·060	do
31				89·5	78·7	S W	·047	
Means	29·736	85·4	77·4	97·1	80·4		3·083 Sum	

August 1858.

Date.	Barometer	Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·797	81·6	76·7	94·5	75·5	S S W	0·620	Clody.
2	·754	83·9	77·9	95·9	78·3	S W	....	do
3	·755	82·3	77·6	93·5	76·7	W S W	·880	Ovcst.
4	·734	83·0	77·6	94·8	79·1	S W	....	do
5	·725	82·4	76·4	93·8	78·9	W S W	....	do
6	·716	84·3	76·6	93·9	80·2	S S W	·010	do
7				94·7	78·5	S W	·090	
8	·715	82·5	76·3	93·8	79·0	W by S	....	do
9	·677	85·6	76·4	97·9	80·2	W by S	....	do
10	·692	87·8	76·4	100·0	81·3	W S W	....	Clody.
11	·733	84·6	77·3	96·8	80·0	S W	.040	do
12	·726	85·9	78·4	98·9	81·0	W S W	....	Ovcst.
13	·782	84·0	78·3	96·6	79·5	W by S	....	Clody
14				95·8	79·8	W by S	....	
15	·810	85·6	78·1	97·7	80·6	W S W	....	Hazy
16	·801	84·7	78·6	95·7	79·7	W	·044	Clody.
17	·802	85·6	79·1	96·6	81·0	W S W	....	do
18	·805	85·3	78·1	96·6	80·8	W S W	....	do
19	·806	86·0	78·1	96·8	80·6	S W	....	do
20	·773	86·2	78·2	96·9	80·8	W by N	....	Hazy
21				96·1	82·5	S E	....	
22	·770	86·0	78·6	98·2	81·1	?	....	Clody
23	·814	85·3	77·8	96·8	78·8	S S W	....	Ovcst.
24	·861	86·0	77·4	99·9	80·6	S S W	....	Clody.
25	·788	85·9	78·2	96·1	80·0	?	....	do
26	·738	85·8	77·8	95·4	79·6	E S E	·390	do
27	·724	86·4	77·6	96·6	81·5	E S E	....	do
28				97·8	82·3	S E	....	
29	·737	87·2	78·3	100·2	81·8	E S E	....	Hazy
30	·701	85·2	77·5	99·5	78·9	S E	·035	Clody.
31	·741	86·2	76·8	97·5	80·1	W S W	....	do
Means	29·768	85·0	77·6	96·6	80·0		2·109 Sum	

September 1858.

Date.	Barometer	Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·786	86·3	77·4	100·0	80·7	S S W	....	Hazy
2	·781	86·6	78·5	98·8	80·0	W S W	0·808	Clody.
3	·766	83·9	77·8	93·1	80·0	S W	....	do
4				95·6	80·4	S S W	....	
5	·764	83·2	78·1	96·7	77·3	S S W	1·479	do
6	·787	80·6	76·7	91·7	76·5	W S W	0·004	Ovcst.
7	·786	80·0	75·7	86·3	76·6	W N W	·198	do
8	·727	79·2	74·9	86·3	77·4	W	·102	do
9	·705	81·8	75·0	90·7	78·1	W by N	....	do
10	·741	83·9	75·3	96·0	79·1	W	....	do
11				95·5	80·2	S S W	....	
12	·745	84·4	76·1	91·9	80·6	S S W	·220	do
13	·759	83·6	75·3	92·2	80·2	S S W	·003	do
14	·766	84·2	75·4	95·0	80·0	?	....	do
15	·775	84·9	76·3	97·9	79·7	S S W	....	Clody.
16	·811	85·0	78·5	96·6	80·3	S S W	·008	Ovcst.
17	·836	83·6	77·8	94·7	78·8	S S W	·770	Clody.
18				95·8	78·8	?	·015	
19	·786	85·1	76·3	94·7	82·0	S W	....	Ovcst.
20	·778	84·6	75·0	95·9	78·4	S S W	....	do
21	·786	84·5	75·4	95·4	79·1	S S W	....	Hazy
22	·816	84·1	75·5	93·8	78·9	S W	....	do
23	·853	84·6	76·1	95·8	78·8	S W	....	do
24	·845	84·9	76·5	97·0	80·0	S S W	....	Clody.
25				96·0	79·5	S S W	....	
26	·835	84·3	77·5	95·8	79·5	W S W	....	do
27	857	84·7	77·9	96·6	79·2	S S W	....	Hazy
28	882	84·5	78·2	93·6	79·4	S W	....	do
29	·882	84·6	77·7	95·1	79·3	S	....	do
30	831	85·6	78·2	94·8	81·0	S S E	....	do
31								
Means	29·795	84·0	76·7	94·6	79·3		3·607 Sum	

? This mark signifies that no means can be taken owing to the variable state of the wind.

HOURLY MEANS.

Gottingen Mean Time.	Noon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Means
Madras Mean Time.	h. m. 4 41	h. m. 5 41	h. m. 6 41	h. m. 7 41	h. m. 8 41	h. m. 9 41	h. m. 10 41	h. m. 11 41	h. m. 12 41	h. m. 13 41	h. m. 14 41	h. m. 15 41	h. m. 16 41	h. m. 17 41	h. m. 18 41	h. m. 19 41	h. m. 20 41	h. m. 21 41	h. m. 22 41	h. m. 23 41	h. m. 0 41	h. m. 1 41	h. m. 2 41	h. m. 3 41	
Bar. at 32° Far. 1858	In.	In.	In.	In.	In.	In.	In.	In.	In.	* In.	In.	* In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Apr.	29·773	29·787	29·810	29·833	29·858	29·872	29·876	29·867	29·850	29·836	29·827	29·825	29·834	29·846	29·866	29·890	29·905	29·902	29·890	29·868	29·837	29·809	29·787	29·772	29·843
May	·645	·663	·686	·708	·726	·741	·748	·737	·724	·709	700	·698	·705	·719	·740	·757	·767	768	·755	·732	705	·680	·658	·645	·713
June	·654	·668	·688	·709	·732	·750	·756	·749	·734	721	·714	·711	·718	.731	·752	·764	·774	·771	·757	·739	·716	·693	·667	.653	·722
Dry Ther. 1885	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
Apr.	88·1	85·7	84·0	83·3	82·9	82·6	82·1	81·4	80·8	80·2	79·8	79·2	78·6	78·2	80·1	83·4	86·3	88·9	90·4	91·2	91·1	91·0	90·5	89·6	84·6
May	88·8	86·9	84·5	83·7	82·9	82·7	82·3	81·8	81·4	80·9	80·4	80·2	79·8	79·7	81·6	84·2	86·4	88·6	90·2	92·4	92·1	92·3	91·9	90·6	85·2
June	90·7	88·4	85·9	84·8	84·1	83·6	83·4	83·0	82·6	82·3	82·1	81·8	81·4	81·2	83·5	86·9	90·1	92·3	94·4	96·1	96·8	97·1	95·6	93·5	87·4
Wet Ther. 1858																									
Apr.	79·3	78·9	78·5	78·4	78·3	78·1	78·0	77·9	77·5	77·3	77·2	76·9	76·5	76·1	77·1	78·3	78·6	79·1	79·6	79·7	79·8	79·6	79·6	79·6	78·4
May	79·3	78·8	78·3	78·2	77·9	77·9	77·9	77·6	77·5	77·1	76·8	76·7	76·4	75·9	76·5	76·9	77·2	78·2	78·1	78·8	79·2	79·1	79·4	79·6	77·9
June	79·3	79·2	78·9	78·7	78·6	78·4	78·3	78·0	77·7	77·4	77·2	76·8	76·4	75·5	76·0	76·9	77·3	77·6	77·9	78·3	78·7	79·0	79·4	79·3	77·9
Bar. at 32° Far. 1858																									
July	29·666	29·678	29·696	29·720	29·740	29·759	29·765	29·761	29·744	29·735	29.729	29·728	29·732	29·744	29·761	29·775	29·786	29·787	29·777	29·761	29·739	29·717	29·690	20·673	29·736
Aug.	·688	.703	·721	·744	·767	·784	·787	·780	·769	·758	·750	·749	·754	·766	·782	·801	·812	·814	·803	·784	·758	·730	·704	·691	·758
Sept.	·723	·739	·764	·790	·814	·830	·832	·823	·810	·797	·789	·783	·789	·800	·819	·841	·854	·851	·839	·817	·785	·755	·729	·720	·795
Dry Ther. 1858	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
July	90·4	88·4	85·6	84·5	83·5	82·8	81·9	81·3	81·0	80·7	80·4	80·2	80·0	79·9	80·9	83·1	85·5	87·7	89·6	91·2	92·5	92·9	93·2	92·0	85·4
Aug.	89·6	86·9	84·4	83·6	83·1	82·6	82·3	81·9	81·3	80·7	80·2	79·8	79·2	79·0	80·1	82·8	85·4	87·6	89.5	91·2	92·2	92.9	92·3	91·4	85.0
Sept.	87·8	85·3	84·1	83·2	82·6	82·2	81·9	81·4	80·9	80·3	79·7	79·2	78·7	78.5	79·5	81·8	83·8	86·1	87·9	89·5	90·4	90·6	90·4	89·1	84·0
Wet Ther. 1858																									
July	78·9	78·9	78·4	78·3	78·3	77·7	77·3	77·1	76·9	76·6	76·4	76·2	75·9	75·4	75·4	76·2	76·8	77·3	77·7	77·9	78·1	78·4	78·8	78·8	77·4
Aug.	79·3	79·1	78·4	78·3	78·2	78·0	77·8	77·5	77·0	76·7	76·5	76·2	76·0	75.6	76·0	76·7	77·1	77·4	77·6	77·9	78·4	78·9	79·2	79·3	77·6
Sept.	77·9	77·5	77·4	77·2	77·1	77·0	76·9	76·7	76·4	76·3	76·1	75.9	75·7	75.1	75·0	75·3	75·8	76·2	76·6	77·1	77·6	77.6	77·8	77·8	76·7

* The numbers in these columns are not observed but interpolated for the sake of obtaining the daily means.

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Report of Madras Literary Society and Auxiliary of the Royal Asiatic Society, on writing Indian Words in Roman Characters.

"The second system of Asiatic Orthography consists in scrupulously rendering letter for letter, without any particular care to preserve the pronunciation; and, as long as this mode proceeds by unvaried rules, it seems clearly entitled to preference." Sir W. JONES.

The Sub-Committee appointed in the early part of last year to consider the best mode of representing Oriental words in Roman characters, beg to submit the following report.

Messrs. Walter Elliot.
W. H. Bayley.
M. Norman.

They must premise by stating, that shortly after their nomination, two of their number were obliged by ill health and the calls of duty, to leave the Presidency, and that they have not, in consequence, been able to discuss so fully as they desired, the various points involved in a subject calculated to elicit considerable differences of opinion. They did not consider that this circumstance absolved them from the duty entrusted to them. Although deprived of the advantage of

personal intercourse, they embodied the independent result at which they had arrived, in separate papers, to serve as the basis of more mature deliberation. Before, however, they had arrived at a unanimous conclusion, Mr. Bayley and Mr. Norman were compelled, by illness, to leave India.

The scheme now submitted must be considered, therefore, to exhibit the conclusions at which the majority of the Committee had arrived on the most salient points only, and must not be taken as a unanimous expression of matured judgment.

The want of a recognized scheme for representing oriental words of daily occurrence, has long been felt. Many attempts have been made to remedy the evil. But with how little benefit the slipslop spelling of proper names and technical terms in official correspondence, and the barbarous names which crowd the face of the best Indian maps, bear witness.*

The object which the Committee have strictly kept in view has been to lay down a scheme of orthography which should provide for the exact representation of every word occurring in the languages of India, under conditions at once easy of application and so exact, as to enable persons acquainted with the original tongue, to reproduce words written according to it, in their native characters. In other words, to submit a system of notation in which "each original " (represented) sound should be rendered invariably by one " appropriated symbol, conformably to the natural order of " articulation, and with a due regard to the primitive power " of the Roman alphabet, which modern Europe has in

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* One of the causes which delayed the preparation of the Múrshadabád Survey Registers was "the character of the Collectory lists. * * * Names are distorted out of all recognition. Thus, the Mahomedan Berahimpoor (Ibrahímpúr) will appear as the Hindoo Biharipoor, and many of our *adumulnisha* enquiries have been in search of Villages which had no existence save on the page of the writer:" *Report on Survey operations, Lower Provinces, from 1st October* 1856, *to 3rd September* 1858, *page* 63.

"general adopted."* They have further considered it necessary that such a system should not only be acceptable to the scholar, but should be adapted to general use, whether by means of typography or manuscript.

For the accomplishment of these ends, they prescribed to themselves the following fundamental rules :—

1. That a distinct Roman character should, as far as practicable, be employed to express each established oriental letter.

2. That the same character should always represent the same letter, and should never be employed without some distinguishing sign to designate a second.

3. That two or more letters should never be employed where a single character could be made to suffice.

4. That diacritical marks should only be resorted to in the last necessity, and should be of the simplest description.

5. That varieties of type, as capitals, italics, black letter, should be considered inadmissable.

6. That the scheme should be founded on the system of Sir W. Jones.

The propriety of the three first stipulations is manifest and needs no illustration. The two next were dictated by the difficulty of using such modifications in current writing, to say nothing of their unsightly and perplexing appearance. The last was adopted because the accuracy of the principles on which that system is founded, especially with regard to the vowels, has been acknowledged by the most distinguished orientalists of all countries, and still maintains its ground after the experience of three quarters of a century.

The modifications which have been proposed in Sir W. Jones' orthography since its first promulgation, and which

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* Sir W. Jones.

relate chiefly to the mode of representing certain consonants, have also been carefully examined.

Among these, the most important are the alphabet adopted by the Missionaries of Upper India in numerous works already printed and published, and which has been followed by Professor Monier Williams ; that employed by Shakespeare in his Hindustani Dictionary, 3rd Edition, 1834; and that prefixed by Professor Wilson to his Glossary of Indian Terms, 1856 ;—the last of which exhibits the first attempt to elaborate a scheme embracing all the languages of India.

At the same time they have not overlooked the modifications observed in the published works of German and French philologists, as far as they have been able to meet with them.

The Missionary alphabet of Bengal, which has only been applied to Urdu, was at once seen to be inapplicable, because it sacrifices critical accuracy to simplicity.

The letters ه and ح are both represented by *h*—ز ذ ض and ظ are all included under *z*—ث س and ص under *s*. The principle of transliteration is thus abandoned.

The plan proposed by Shakespear is free from this defect, but is also confined to the Urdu dialect in its Arabic and Dévanágari forms. It has much merit, but contains several redundancies, providing for distinctions of sound not expressed by corresponding letters, but to be acquired by practice, and therefore unnecessary in a scheme of strict transliteration. There are also some minor blemishes in his mode of dealing with *ch, ch'h, gh, kh, ksh.*

Professor Wilson's scheme is complete in its requirements, but cumbrous in the mode by which he has carried them out. Thus, five of the six characters for *n*, are represented by infra-linear diacritical marks, of which the first is an open dot, and the rest points increasing in number from one to

four. The three *zeds* and three *esses* are similarly distinguished. Such complications are perplexing in type and unsuited to cursive writing.

On a comparison of these four schemes, it is seen that the mode of designating the vowels is nearly the same in all; that Sir W. Jones adopts a system of supra-linear marks to distinguish the consonants, and that his followers, admitting the propriety of the principles laid down by him, have confined their modifications to the substitution of infra-linear signs differing only in the greater or less simplicity of their application.

If a printer is asked, whether with an ordinary fount of types, it is easier to add diacritical marks above or below the line, he will give the preference to the former and to those of the simplest description only. The use of accentual signs above the line, is of ordinary occurrence in every press. Hence the original scheme proposed by Sir W. Jones possesses this advantage, of facility of application, in an eminent degree.

The chief objection brought against it consists in the similarity of the sign employed to distinguish long vowels and certain consonants, and in the liability of such marks, when used in juxta position, to create confusion. Its minor defects consist in the absence of letters required for certain sounds in the Hindi and the Dravidian dialects, (which formed no part of his plan,) in the unnecessary re-duplication of the signs employed to express ع and ح, and in the compound marks over two of the *zeds*. In other respects, his system presents a marked advantage over all others, whether it be viewed as applicable to the resources of an ordinary printing office, or to employment in manuscript.

It may be urged, that the objection raised to complicated diacritical signs can be overcome, as in fact it is, by casting types for the purpose. But a fundamental object to be kept in view in any scheme of general application, is facility of

execution by means of an ordinary fount of Roman type in any press; and this prelimary condition, if maintained, is fatal to the employment of compound diacritical points. The objection applies with still greater force to their use in cursive writing. Single accentual signs and dots are of comparatively easy addition by the pen, but more than these tend to create obscurity and blots.

It has appeared to the Sub-Committee that a combination of both systems will be found to afford the best means of securing perspicuity of notation with easy application.

The class of letters in the Nagari alphabet commonly denominated cerebral,* are now generally defined by a single diacritical point below each letter. Let this be taken as the distinguishing sign of this class and its congeners in other tongues, as well as of all letters of a peculiarly harsh or hard sound.

The expedient adopted by Sir W. Jones to indicate aspirated consonants by the apostrophe used to signify the soft breathing of the Greek alphabet, and to some extent recognized in the Roman, must be allowed to be peculiarly appropriate. It was first devised by Halhed, who placed it at the bottom of the line, in which he was followed by Gilchrist. Sir W. Jones removed it to the top. Klaproth and Bopp applied it to the same purpose, omitting the *h* and reversing the comma. But this, as will appear in the sequel, has been reserved for another purpose. Although the Jonesian application has not been so generally employed as it seems to deserve, the majority† of the Committee recommend its adoption on the grounds of fitness, perspicuity, and easy application. It sets free the similar characters used to represent خ and غ with the addition of diacritical marks, and obviates

* This rendering of the Sanscrit grammatical term *múrddh'anya,* from *múrdd'hàn,* " the head," has been objected to, and the word " lingual" proposed instead. One writer suggests "cacuminal," as the most appropriate term.

† Mr. Norman dissents.

the possibility of mistaking the sound of the aspirates themselves, especially in the familiar English pronunciation of *th, ph, ch,* &c.

The strong aspirate at the close of syllables in Sanscrit words, called *visarga,* may be represented by a similar device, or the spiritus asper may be substituted, as ʽ*h.* This can never occasion confusion as the *visarga* always follows a vowel.

In dealing with the Dévanágari alphabet, the only remaining letters to be discriminated are those expressing the sibilants and the nasals.

The Committee will complete their examination of this alphabet first, because it is the basis of all Hindu alphabetic writing, and has been more or less completely adopted by all the rest, and then proceed to notice such letters as are peculiar to the Arabic and Dravidian phonetic systems.

Of the Nágari sibilants, the only one calling for consideration is the first—or श, which is "often very inaccurately "confounded with the second, or ष, and even with the third, "or स. It belongs to that class of consonants which, in the "notation here proposed, are expressed by acute accents above "them, to denote an aversion of the tongue towards the palate, "whence this letter is called the *palatine sa.* In the same "manner may be noted the *sád* of the Arabs and Hebrews, "which last it resembles in shape, and probably resembled, in "sound."*

The majority of the Committee resolve to recommend this sign.†

The nasals are five in number.

1. The *anuswara,* signified by a ▪ above the line, and therefore most fitly represented by a Roman *ṅ* with a similar mark.

2. For the guttural *n,* or that pertaining to the first class of Nágari letters, a compound or double symbol, might

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* Sir W. Jones. † Mr. Norman dissents

with much propriety be adopted. Its sound is exactly that of the letters *ng* in *sing*, *long*, &c., and these letters, therefore, seem to present the fittest substitute. But Sir W. Jones objects to the addition of the *g*, on the ground that it might create confusion, and often suggest the idea of a different syllable. This difficulty might be overcome by tying the two letters with an infra-linear line, but such complicated signs are objectionable in themselves, and are, moreover, proscribed by our 3rd rule. The line below the *n̲* alone, may therefore be retained as the characteristic of this sound. Sir W. Jones, viewing it as identical with *anuswara*, employs the same mark for both, but in doing so, transgresses the fundamental rule which requires exact transliteration.

3 and 4. The palatal and cerebral *ens* should, by analogy, follow the rule already in such cases provided, the former being represented by an accent above, the latter by a point below, the line. But as the sound of the first is exactly identical with that of the Spanish *ñ* and Portugueze *nh*,* and provision has to be made for another more purely palatal *n* in the Tamil ண, it seems advisable to adopt the Spanish *ñ*, which presents a familiar representation of the exact power of the Sanscrit letter, and thus to leave the palatal symbol available for the Tamil *n* (ண.)

5. The last, or simple *n*, needs no distinguishing sign.

The Sanscrit alphabet concludes with a character expressing a sound compounded of *k*, *s*, and *h*, which it has been usual to represent by these three letters in sequence. Others have employed the Roman *x* for the same purpose, and considering that this letter is also a compound of *k* and *s*, and is not otherwise required, the majority of the Sub-Committee recommend that it should be appropriated to that sound.†

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* "Containing a composition of *n* and *y* as in the English word *onion*, "and Italian *agnello* which written phonetically would be *onyon*, and *anyello*."—Sir W. Jones.

† Mr. Norman dissents.

The Nágari alphabet, thus adjusted, will stand as follows, with its corresponding Indo-Arabic and Roman representatives:—

Vowels.

अ	आ	इ	ई	उ	ऊ	ऋ	ॠ	ऌ	ॡ
اَ ,,	آ	,,	يِ	,,	وُ	رِ	رِي	لْرِ	لْرِي
a	á	i	í	u	ú	ri	rí	lri	lrí

ए	ऐ	ओ	औ	अं	अः
ي	اي	و	او	ں	ه
e	ai	o	au	ṅ	'h or ʻh

Consonants.

Gutturals.	क	ख	ग	घ	ङ
	ک	کھ	گ	گھ	ں
	k	k'h	g	g'h	n̲
Palatals.	च	छ	ज	झ	ञ
	چ	چھ	ج	جھ	ں
	ch	ch'h	j	j'h	ñ
Cerebrals.	ट	ठ	ड	ढ	ण
	ٹ	ٹھ	ڈ	ڈھ	ں
	ṭ	ṭ'h	ḍ	ḍ'h	ṇ
Dentals.	त	थ	द	ध	न
	ت	تھ	د	دھ	ن
	t	t'h	d	d'h	n
Labials.	प	फ	ब	भ	म
	پ	پھ	ب	بھ	م
	p	p'h	b	b'h	m

Semi-Vowels.	य	र	ल	व
	ي	ر	ل	و
	y	r	l	v
Sibilants.	श		ष	स
	ص		ش	س
	ś		sh	s
Aspirate and Compound.	ह		क्ष	
	ه		کش	
	h		x	

THE DRAVIDIAN ALPHABETS.

All the Southern races have adopted the Arian phonetic system except the Tamil people, and they, while retaining their own peculiar system of letters, have formed a second alphabet, founded on the Arian, for Sanscrit literature, which has been extensively cultivated among them. This is called the Grand'ham character.

The Telugu, Canarese, and Malayálam nations have taken the Nágari letters under altered forms, but with the Sanscrit classification and arrangement. The same Roman characters therefore will, so far, serve for all.

Many of the Tamil and some of the Telugu letters are liable to changes of sound with reference to their position or to their derivation from Sanscrit, and some discussion took place regarding the propriety of providing distinct Roman equivalents for such sounds.*

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* "Of the Sanscrit letters, all vowels except the four medial and two " final are common to Tamil ; as are also the first and last letters of the five " classes of consonants ; the four, following in order, from ய ; and that written " ண ; twenty-five in all. The remaining twenty-eight undergo change." *Nannul,* Book iii. *Sutr.* 19.

Mr. C. P. Brown has represented the Telugu చ by *ç* and the జ by *z*, restricting the true sound of the Nágari च or *ch* to words of Sanscrit origin.

It appears, however, to be unnecessary in a system of strict transliteration to provide more symbols for a letter, however variable in sound, than the people possess themselves. In using a romanized character, such anomalies must therefore be learnt by practice, as they are at present mastered by the natives themselves, who employ the vernacular characters under precisely similar circumstances.

The only exception which appears necessary is in the reduplicated Tamil sounds of த, ட and ற or *d*, *ḍ* and *ṙ* which become *tt* *ṭṭ* and *t̀t̀* and this has long received the sanction of general usage. These have therefore been admitted. The changes occurring in other letters will be found enumerated in Appendix B. p. 32.

We have also adopted the rule which gives the normal sound of the Devanagari characters to words adopted into Tamil and have represented them by their corresponding Roman letters.

Mr. Brown's expedient however suggests another use for the letter *ç* and that is, it's substitution for the *ch* of च, which, cumbrous in its simple romanized form, becomes still more awkward and unsightly in its re-duplicated and aspirated shapes.* The letter *c*, the only character remaining unappropriated, is also available for the same purpose. This however is simply thrown out as a suggestion, which we have

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* *e. g.* In the words چھچھوندر and छुछुन्दरी *ch'huch'hundar* and *ch'huch'hundari* "a musk rat"; چھچھوندر چھور *ch'huch'hundar ch'hor*, "a back-biter;" చొచ్చుచున్నా. *chochchuchunna* "to rush in."

Prof. Bopp, appears to have adopted the expedient here recommended; thus he writes the title of the celebrated drama called the Toy-cart, *Mric'c'akati*.

not ventured to adopt, but which we consider to be worthy of farther consideration.

Besides these, there are seven other letters peculiar to the Dravidian dialects, which were probably once common to all, but the whole of which are found in Tamil alone at the present day. They are எ ஒ ள ற ழ ன and [illegible] or ஃ.* Of these the three first only, have been retained in Telugu and Canarese, and the five first in Malayálam.‡ The two last are confined to Tamil.

The two vowels are simply the short sounds of *e* and *o*, and as the corresponding Sanscrit vowels are always long, and are so designated in the scheme at page 9, no farther provision is required for them.

The Tamil ள, Malayálum ള, and Telugu and Canarese ళ, is not unknown to the Nágari alphabet, and is still found in the older Sanscrit of the Védas, but it has fallen into disuse. It comes under the head of cerebral sounds, and is therefore properly represented by *ḷ* with the mark assigned to that class.

The Tamil ற, or Malayálam റ, has the force of a prolonged palatal *r*, of which the Hindi ڑ seems to be the Urdu equivalent. In its re-duplicated form it becomes *tt* and will be rightly typified by these corresponding letters with the palatal sign—or *r̀* and *t̀t̀*

The next letter ழ, which is confined to Tamil and Malayálam, may be termed the *vexata litera* of the Dravidian, as ع is of the Semitic tongues.

For the difficulties which impede the appropriate rendering of this sound, we refer to Appendix A. p. 21. The various

* *Note*:—In Nannúl, it is said that the letters எ, ஒ, ற, ழ and ன only, are peculiar to Tamil, together with some peculiar sounds of vowels (called "dependant letters) with the exception of vowel-consonants and prolonged vowels". *Book* iii. *Sutr.* 23.

† Peet's Grammar, p. 7.

expedients which have been proposed by different writers resolve themselves into a choice between *r* and *l*, if a single letter is employed—or *zh* if a compound character is admissable.

Two of the highest authorities in Tamil literature, Dr. Caldwell and Mr. Pope have pronounced the letter on philological grounds to be a form of *r* but general use and analogy are in favor of considering it a cerebral *l*. The Committee have therefore resolved to adopt the latter. There being already two *els*, the proper diacritical mark would be a point above, but this being unsuited to the shape of *l* they resolve to recommend a line below or *l̲*.

The Tamil ண seems to differ in no wise from the ordinary *n* fully enunciated as a palatal sound. It should therefore be noted as *'n**

The last letter is the equivalent of the Arabic خ and like it should be represented by *kh*.

THE ARABIC ALPHABET.

Thirteen letters peculiar to Semitic alphabets remain to be rendered by Roman equivalents.

They are :—

ث	ز	ف
ح	ژ	ق
خ	ض	ع
ذ	ط	غ
	ظ	

of which six [or seven including ص] *viz.*, ث ح ص ض ط ظ ع are reckoned by grammarians to pertain exclusively to the Semitic languages.

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* "The sound of this character although no longer represented by a specific sign in the Malayalam alphabet, seems to be not unknown in the spoken language." Peet's Grammar, p. 4.

The first is pronounced in Arabic exactly like the English *th* in *thing*—but in India it has simply the force of dental *s*, and but for its occurrence in a few words of Arabic origin might be discarded altogether. As an anamolous letter, it may be distinguished by *s* with a point above or *ṡ*.

The deep guttural breathing represented by ح is generally rendered by *ḥ* which as distinguished from the ordinary *h* seems in all respects appropriate.

The stronger guttural sound of خ common both to Arabs and Persians, is universally rendered by *kh* with or without a diacritical mark. Provision having been made for the aspirated sound of *k*, it does not appear to us that any such distinction is required.*

The Arabic and Persian ز expresses the simplest sound of *z*. The ذ which is also common to Arabia and Persia is a very soft dental sound of the same letter. As an anomalous letter it might be indicated by a supra linear point and the infra linear sign would then be assignable with much propriety to the cerebral form of the same sound in ظ. But it is desirable to retain the same sign for the sister forms of ط and ظ and the cerebral sign of *ṭ* being already pre-occupied in the Devanagari alphabet, another expedient must be devised.

It is proposed to indicate ذ by *z* with a line below or *z̲* (already adopted by Shakespear) leaving the anomalous sign for ط and ظ as *ṫ* and *ż*.

This is the less objectionable, because these two letters do not properly fall within any of the established phonetic classes of letters, being enunciated by rolling the inverted

* Prof. Max Muller has proposed to represent these two sounds by *h* with the soft and hard aspirates or *'h* and *ʻh*, but however well adapted for a purely phonetic system they are unsuited to one proceeding on the rule of strict transliteration. The missionaries of upper India likewise discussed the plan of omitting the *h* and expressing خ by *k* alone but rejected it as untenable.

tongue, round one side of the mouth from the hindermost molar towards the front teeth.

To ص has already been assigned the mark of the palatal *ṡ* and on the score of analogy the ض should be distinguished in like manner by *ż*.

The next letters ف and ق present no difficulties. The first is precisely the English *f;* to the latter has been assigned the letter *q*, an arbitrary arrangement, but one which has been very generally adopted and which effectually guards against confounding it with *k*.

With regard to ع which has been the subject of so much controversy, we desire to recommend the expedient proposed by Mr. Bayley of substituting a reversed comma above the line, for the reasons so fully stated at page 35 of Appendix B. It is supported by simplicity of application whether in writing or print, being nothing more than the single inverted comma, used to mark a quotation within a quotation, in ordinary printing. By the latest modification of the Indian Missionary alphabet, it has been resolved to write the vowels represented by ع with a comma before or after the letter—but on the top of the line, as *'a'amál* for اعمال. This plan is also deserving of commendation.

For غ a double character *gh* has long been in use with very general approval. More recently the Missionaries have proposed to drop the *h* and have added a point in the lower loop of the *g*—a gain on the side of simplicity in typography when special provision has been made for the purpose, but impossible of execution in ordinary type and difficult of notation in cursive manuscript.

The Persian ژ has been rendered in all systems by *zh*. It is of extremely rare occurrence and the double sign may be retained. If the same double character be assigned to the

Tamil ழ, the Persian representative might be tied by a line below—as z͟h.

The anomalous sounds peculiar to certain dialects and which find no place in the Arian system will then be represented as follows :—

f	for	ف	r̀	for	ற, റ
gh	„	غ	ṛ	„	ڙ
ḥ	„	ح	ṡ	„	ش
kh	„	خ	ṭ	„	ط
ḷ	„	ள ళ Tel. and Can. & ള	z	„	ز
ḻ	„	ழ Tamil and Mal.	z̲	„	ذ
'n	„	ண	z̀	„	ض
q	„	ق	ż	„	ظ
			zh	„	ژ

To resume :

The scheme here submitted provides for the representation of every oriental letter employed in India by a single Roman letter, and where required, by the addition of a single diacritical sign, except in five instances, in which double consonants are introduced.

The diacritical signs are :

1. The acute accent over all long vowels.

2. The soft breathing or apostrophe ' with *h* for the aspirated consonants.

3. A point below the letter for the class of letters termed cerebral consonants.

4. An accent above the letter for those styled palatals. The acute accent having been appropriated to the vowels, the grave accent may be substituted for the palatals to prevent confusion.

5. A point above the line for anomalous sounds except in the case of the nasal *n* for which we have borrowed the familiar Spanish *ñ*

6. A line below the letter in two instances when the three descriptions of signs already adopted were exhausted and in a third where the only one available was inappropriate.*

7. The double letters admitted in five instances, are *ch, kh, gh, sh,* and *zh.**

Of these it is possible that the first or *ch* may yet be dispensed with.*

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* We propose to exclude the Déva nagari *lri* *lrí* because of such rare occurrence as to be well-nigh obsolete. The Persian *zh* may be reckoned in the same category, which would leave but three double signs, if *ch* was represented by *c* or *ç*.

APPENDIX A.

As a foundation for the report which the Sub-Committee was appointed to prepare, I would propose the six following axioms :—

1. That the scheme be founded on the system of Sir W. Jones.

2. That a distinct Roman character should be used for each oriental letter.

3. That the same Roman letter shall always represent the same vernacular letter and shall never be employed to designate any other.

4. That two or more letters shall never be taken to represent an oriental character or sound where a single letter will suffice.

5. That diacritical marks should only be employed in the last necessity.

6. Varieties of type as capital, italics, &c., to be declared inadmissible.

Professor Wilson has already drawn up a scheme embracing most of these requisites which is printed in the introduction to his Glossary.

I am not disposed to depart from this, except in a few particulars, where it appears to me to be susceptible of improvement.

I will notice shortly the points in which I differ from that scheme beginning with the Deva Nagari Alphabet.

Deva Nagari.

In adopting this Alphabet as a basis, we shall have the most perfect phonetic system of classified sounds which, according to Prof. Max Muller, has ever been invented. And this because it was taught by the voice alone, for ages after the Sanscrit language had been brought to a high degree of cultiva-

tion and before the invention of written characters. Thus the word now used for "learning, instruction," is *siksha*, the normal meaning of which is " the proper pronounciation of the vocal sounds occurring in the Vedas as explained by Pánini" (Wilson) in other words "phonetic science".

The aspirated consonants are represented by the addition of the letter *h*. I prefer the practice of Sir William Jones which has been adopted by several continental orientalists who as well as some of our own, add an apostrophe with or without the *h*. I adhere to the Jonesian practice of the comma above as *k'h g'h*, &c.

I do so because these letters are necessarily required to express the sounds of خ and غ and would therefore need a diacritical mark; because *th* at once suggests to English readers the sound of these letters in *the*, *think*, &c, *ph* the sound of *f* in *physic*, *rh* the sound of hard *r* in *rhinoceros*, *rhizome* &c.; because such a general mark as the (') at once suggests the idea of a simple aspiration or breathing in in all places where it occurs, and influences the pronunciation accordingly.

Professor Wilson has changed the romanized symbol of श from *s'* to ṣ in accordance with his system of distinguishing all letters requiring diacritical marks, by points below the line. I prefer the former or Sir W. Jones method which is generally adopted both by English and German orientalists, because it is already established & because in a general system where provision must be made for the three sibilants of the Arabic alphabet also, resort must otherwise be had to more complicated marks.

I object to Wilson's mode of writing *anusvara* by ṇ̥, and the others by infra linear points. Thus, besides the normal *n* he has five so designated, the last with *four* dots under it.*

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* Vide Axiom 5.

I would place the mark above, because in conformity with native usage and because, in manuscript, the circle would often become a dot and thus create confusion.

But might not both *anusvara* and *visarga* be expressed by their original characters • and : which would comport very well with Roman type and be not at all unseemly?

Further, I would adopt for the palatal *n*, which Wilson represents by *n̤*, the spanish *ñ*; for the guttural *n* the double letters *ng* or *n̲*; for the cerebral *n* an *ṇ* and for the Tamil palatal *n* an *ǹ*.

Wilson has no distinction between the Nagari ऋ ॠ and the Hindi ڑ and Tamil ற all of which he expresses by *ṛ* or *ṛi* and *ṛí*.

The sounds are altogether different. I would write

ऋ	r̲i	ॠ	r̲í
ڑ	ṛ		
ற	ʽr	ற்ற	t't'

The letter क्ष is usually written *ksha* and I am free to confess these letters represent the sound perfectly. But many Orientalists particularly those of France use an *x*. This practice is in accordance with axiom 4.

Tamil Alphabet.

The only letters that call for notice in Tamil, are:—

ள

ற

ன

ழ

The first, which is also common to the other southern dialects, is an original Sanscrit sound, and is found in the old alphabets of that language. It is a hard *l*, which is appropriately marked by a point below or *ḷ*

The next letter, if only representing the prolonged sound of *r* as uttered in perfection by the Todas of the Nilagiris, would easily be distinguished by a diacritical mark. But in

its re-duplicated use it becomes *tt** and as there are already த்த and ட which are written *tt* and *ṭṭ*, I would recommend, as proposed above, that this character should be expressed by *r̀* and ற்ற by *t̀t̀*.

This is contrary to the 3rd proposed fundamental rule but the genius of the Tamil language and its poverty in phonetic signs require a relaxation of the axiom, to provide for differences of sound of the same letter, under different circumstances, as in the cases of க, ச, த, ட, ப and ற, which may be read respectively as *k* and *g*—*s* and *ch*—*t* and *d*—*ṭ* and *ḍ*—*p* and *b*—*r* and *t*. But as several of these depend on the position of the particular letter in relation to others, which every Tamil scholar soon learns by practice, I would confine the substitution of other Roman characters for the normal one, to the double *tees* and to such words as have been adopted from Sanscrit.

The Tamil ன it has already been proposed to designate by *ǹ*.

The last letter represents a sound peculiar to the Dravidian dialects and now retained only in Tamil and Malayàlam. It is a mixture of *j*, *l* and *r*, and is only pronounced in its purity by the pure Tamil races the Veḷḷázhars and Mudaliyárs. The Todas also enunciate it with peculiar fullness.

The difficulty of finding a suitable Roman equivalent is best exemplified by enumerating the attempts hitherto made to represent it in a Roman dress.

Ziegenbalg 1714 employs......................rl and rhl
Beschi, 1728... l—j
—, pref. of Sen Tamil grammar (Babington's translation)... zj
Ellis, 1816... zh

* According to Rhenius the true sound of the double ற is *tr* "though the *r* is sounded rather softly and quickly ; but the common people pronounce it like *tt*." *Gram. p.* 17.

Anderson, 1819, (when medial)..................	r
———— (when final).....................	l
Babington 1822, Trans. Beschi's Sen Tamil grammar..	zh
Rhenius 1834, " a kind of"	rl
Graull 1854, in the Kaivalyanavaníta..........	l̲
Wilson 1855, Glossary............................	l in Tamil. r̤ in Malm.*
Caldwell 1856, Comp. grammar.................	r̤
Pope 1856, First Lessons "something like the Welsh ll" with the force of rrr................	r
—1859 Tamil hand-book do. do. and...........	r̤
B. H. Hodgson 1856..................................	zy
The French Jesuits..................................	xh †

Beschi describes it as being " quoque aliud *l*, quod crassiori sono, reflexâ omnino ad interiorem palati partem linguâ, pronunciatur ;" adding in a note " in aliquâ istius regionis parte sonat quasi *j*." *Tamil Gr.* ch. 1. s. 2.

Rhenius observes, " for ழ we have no proper sound in English or any other European language ; it is a mixture of *r* and *l* imperceptibly coalescing by turning the tongue upward to the roof the mouth." *Gramr. 3rd ed p.* 16. Thus he writes எழுத்து *erluttu.*

According to Dr. Caldwell "this distinctive Dravidian semi-vowel is found in the Tamil alone. Its sound resembles that of the English *r* after a long vowel, as in the word *farm*, but it is pronounced further back in the mouth, and in a still more liquid manner. It is sometimes expressed in English books as *zh* or *rzh* but this is merely a local pronunciation of the letter, which is peculiar to the northern district of the Tamil country : it is at variance with its affinities and its interchanges,

* By a typographical error the Malayalam ര and ழ in Prof. Wilson's alphabetical table at p. xi of the glossary have been made to change places.

† This *x* seems to have been intended for the Greek χ. Thus they write ழாந்தி *Xhánti*, "a heathen."

and is likely to mislead the learner. *ṛ* is the only Drâvidian consonant which is pronounced differently in different districts. In the Southern districts of the Tamil country, it is pronounced by the mass of the people, exactly in the same manner as *ḷ*, which is the letter invariably used instead of *ṛ* in Canarese. Between Tanjore and Pondicherry, it is softened into *rzh*, or *zh*; and in Madras and the neighbourhood, this softening process has been carried to such a length, that in the speech of the vulgar, *ṛ* has become a silent letter."

"The Telugu, which commences to be spoken about two days journey north of Madras, has lost this letter altogether. Generally it uses *ḍ* instead, as the Canarese uses *ḷ*, but sometimes it uses no substitute, after the manner of the vulgar Tamil of Madras. Looking at such Telugu words as *kinda*, 'below,' answering to the Tamil *kîrnda* and *vingu* 'to swallow,' answering to the Tamil *virungu*, we cannot but suppose, that the Telugu had this letter originally, like the Tamil, and that it lost it gradually through the operation of that softening process which, in the colloquial Tamil of Madras, converts *kîré*, 'below,' to *kîé*." *Comp. Gram. p.* 108.

Mr. Pope considers the Tamil *r*, *n* and *t*, to possess each three sounds, a dental, a palatal and a cerebral while to *l̲* he allows only two, a palatal and a cerebral. In pursuance of this analogy he assigns to ழ the cerebral place of *r* and gives the following rule for its pronounciation "apply the tip of the tongue, as far back as you can, to the palate and pronounce a rough *r* in which a sound of *z* will mingle. In the South, unable to articulate this letter, they use a strong *ḷ* (ள) instead. In the North in the same way they use ய (*y*) for ழ." *Tamil Hand-book p.* 11.

The only conclusion to be drawn from these various statements is that the ழ represents a sound altogether *sui generis* or as Professor Wilson expresses it, "the enunciation is singularly obscure and cannot be precisely represented by any written characters."

But this sound* is by no means peculiar to the Dravidian dialects. It is found to prevail equally throughout the aboriginal Indo-Chinese tongues of the Himalayas and Tibet Hodgson refers to it repeatedly. "The second *z*," he observes, presented by me by *zy* and equal to the French *j* in *jeu*, is the same with the Tamil *zh* of Ellis and Elliot. It is a very prevalent sound and equally prevalent is the French *u* or *eu* in *jeu* aforesaid. Neither is ever heard from an Arian mouth,"&c.† Even among the aborigines, he adds, the influence of Arian vocables is gradually bringing them into disuse. And this is also the case in the South, where from the same cause, they have gradually disappeared from the Telugu and Canarese.

It becomes a matter of interest therefore, to observe the expedient employed in these two dialects, to replace the absence of this characteristic sound, in words of common origin.

The following

* Pref. to Gloss. p. xv.

† Hodgson, Aborigines of the Nilagiris in Journal As. Soc. Bengal, XXV, p. 503.

The following is a list of words taken at random :—

Tamil.	*Malayalam.*	*Telugu.*	*Canarese.*	
கோழி kózhi.	കോഴി kózhi.	కోడి kóḍi.	ಕೋಳಿ kóḷi.	A fowl.
எழு ezhu.	ഏഴ ezha.	ఏడు éḍu,	ಏಳು éḷ u.	Seven.
எழுநூறு ezhunúṙu.	എഴുനൂറ ezhunúṙ.	ఏళ్నూరు éḷúnúru.	ಏಳುನೂರು eḷunuru.	Seven hundred.
கூழ் kúzh.	കൂഴ kúzh.	కూడు kúḍu.	ಕೂಳು kúḷu.	Pottage.
மழை mazhai.	മഴ mazha.	వాన vána.	ಮಳೆ maḷe.	Rain.
சுழி suzhi.	ചുഴി chuzhi.	సుడి suḍi	ಸುಳಿ suḷi.	A circle.
தாழை tázhai.	താഴ tázhai.	—	ತಾಳಿ táḷi.	The Pandanus plant.
மொழம் mozham.	മുളം muḷam.	మూర múra.	ಮೊಳ móḷa.	A cubit.
பாழ் pázh.	പാഴ pázh.	పాడు páḍu.	ಹಾಳು háḷu.	Waste.
கீழ் kízh	കീഴെ kizhe.	కింద kinda.	ಕೆಳಗೆ keḷage.	Down, below.
மெழுகு mezhuku.	മെഴുക mezhuka.	మయినము mayinamu	ಮೇಣ maina.	Wax.
வாழு vázhu.	വാഴു vázhu.	వాడు vádu*	ವಾಳು váḷu.	To live.
உழு uzhu.	ഉഴ uzha.	—	ಉಳು uḷu	To plough.
பழம் pazham.	പഴം pazham.	పండు paṅḍu.	ಹಣ್ಣು haṅnu.	Fruit.
கொழி kozhi.	കൊഴി kozh i.	కర్రు karru.	ಕಾರು káru	A plough share.

* The use of *vádu* is nearly obsolete. It is only now occasionally applied to a wife going to live in the house of her husband.

From these examples, it appears that the Canarese substitute a hard *ḷ*, the Telugus generally a hard *ḍ* and sometimes an *ḷ* which is occasionally softened away as in the words for *wax, below, fruit,* &c.—Some times eliding it altogether as in the word முழங்கால் *muzhan̲kàl,* "the knee" which becomes మోకాలు *mókálu.*

So completely has the letter disappeared from Telugu, that the Vadagala Vaishnavas of Telingana who are obliged to repeat daily, portions of the sacred verses composed by the twelve Azhwárs, which they commit to memory from versions written in Telugu characters, finding no letter to represent ழ have adopted the expedient of restoring it bodily in its original Tamil shape.

Notwithstanding the high authorities of Messrs. Caldwell and Pope, I am unable to concur in their view of considering the letter to be an *r.* In this, I am supported by the Native grammarians. The author of the Sabda manjari, the Tamil version of Páṇinis phonetic grammar, distinctly affirms the identity of ழ and ள* which he illustrates by the following examples :—

உழுந்து *uzhunda* becomes	உளுந்து *uḷundu,* a kind of pulse.
குழகம் *kuzhagam.*	குளகம் *kuḷagam,* a verse.
சோழம் *sózham.*	சோளம் சோடம் *chóḷam* and *sóḍam,* a kind of grain.

So far the balance of authority preponderates in favor of resorting to *l* which should then be distinguished by some diacritical mark.

There is however sufficient evidence to show that the letter is an original Turanian sound which has gradually

* ழ,ள, யோரபேத, "There is no difference between ழ and ள." It is remarkable that the original dictum of Pánini from which this is adopted runs thus, डळयोरभेद: "between *ḍ*, and *ḷ*, there is no difference." Thus we have *d, zh* and *l* replacing each other in the Southern dialects.

become obsolete from its incompatibility with the Arian phonetic system and that the various changes it has undergone in the examples quoted, are so many make-shifts to get rid of it. If we wish therefore to represent it clearly, we must assign to it a special sign and for this purpose, I am decidedly of opinion that we should retain Ellis expedient of writing *zh,* an arbitrary sign it is true, but one incapable of being mistaken for anything else and at least as appropriate as any other that has been suggested. For let any one follow exactly the mode of pronunciation laid down by Native grammarians as explained by Beschi, Caldwell, and Pope without any preconceived idea in favor of a particular letter and the sound emitted by simply forcing the voice through the organs, will be neither a liquid *l* nor a trilling *r* but a gushing utterance which comes near to *ajh* or *azh* than any other combination of sounds that I can conceive.

Arabic Alphabet.

This is the most difficult character to deal with, both on account of the larger number of sounds peculiar to itself, which it contains, and because these are pronounced so differently by different races* which make use of it. The Muhammadans of India altogether fail in enunciating the true sounds of ش, ذ, ص, ض, ط, ظ, which are for the most part reduced by them to *s* and *z*, as among ourselves.

I have already stated my objections to Wilson's representation of خ

غ

ژ

I also object to his exchange of *ḥ* from ح to ه as an unnecessary innovation and as less fitting in itself: ه has

* The Egyptain Arabs pronounce the ق as *g*. e. g. *galb* for *qalb* "the heart" and the Basarah to and many of the Syrian Arabs invariably gave the sound of *ch* to ك as *chalb* for *kalb* "a dog."

exactly the sound of the Roman *h* whereas ح has a peculiar guttural sound which I conceive to be more appropriately designated by an additional sign or mark.

I differ also from the Professor in using *ḳ* for ق and in conformity with the principle laid down in rule 2, and with the generally adopted practice, I would employ *q* for that purpose.

There remains the *vexata litera* ع which Wilson writes as *â* with a circumflex over it.

This does not appear more happy than any of the preceding schemes which have been suggested.

I like the plan adopted by the Missionaries in Bengal and followed by Dr. Sprenger and some of the Bengal orientalists of employing a comma above the line as l'nat, لعنت adding a vowel where necessary as in mal'ún ملعون

l'àb لعاب

ìn'ám انعام

or it might be represented by the short vowel with a comma over it, as

mal'aún

l'aáb

ín'aám

The letter ث is represented in Wilson's scheme by s̬ which has this propriety, that the diacritical signs are the same as those of the original. But the true sound of the letter is the English *th* and I am inclined to think that sign is preferable. A familiar instance occurs in the word ثمر *thamr,* fruit, as ثمرهندي *thamar hindi,* the Tamarind. But in India, the sound has been very generally corrupted to that of a pure sibilant *s,* so that I would not insist on any change.

Walter Elliot.

APPENDIX B.

TELUGU.

అ	a	as the a in "about" and "delta."
ఆ	ā	as the *long* a in "father."
ఇ	i	as the i in "pin;" or y in "truly."
ఈ	ī	as the *long* i in "pique."
ఉ	u	as the oo in "good."
ఊ	ū	as the *long* oo in "food."
ఋ	ṛi, ṛu	as the ri in "rim," and roo in "rook."
ౠ	ṛī ṛū	as the rea in "ream," and roo in "rood."
ఎ	e	as the e in "mendicant," (nearly the French é.)
ఏ	ē	as the ey in "grey," (nearly the French ê.)
ఐ	ai	as the ai in "aisle," or ei in "height."
ఒ	o	as the o in "police."
ఓ	ō	as the *long* o in "story," and "prose."
ఔ	au	as the ou in "foul," or the ow in "drown."
క	k	as the k in "king."
ఖ	k'h	aspirate of the preceding. As k h in "pack-horse."
గ	g	as the g in "garden" and "legacy."
ఘ	g'h	aspirate of the preceding. As g h in "gig-horse."
ఙ	n	as the ng in "angle."
చ	ch	with the vowels i ī e ē ai, as the ch in "church." [*Note* 1.]
	ts	with the vowels a ā u ū o ō, as the ts in "jetsam."
ఛ	ch'h	aspirate of the preceding ch; as ch h in "coach-horse."
జ	j	with the vowels i ī e ē ai, as the j in "jelly."
	dz	with the vowels a ā u ū o ō, as the dz in "adze." [*Note* 1.]
ఝ	j'h	aspirate of the preceding j.
ఞ	ñ	as the gn in "mignon," or the ni in "onion."
ట	ṭ	a peculiar hard or palatal t, like t in "trump."
ఠ	ṭ'h	aspirate of the preceeding.

డ	ḍ	a peculiar hard or palatal d, stronger than d in "drum."
ఢ	ḍ'h	aspirate of the preceding.
ణ	ṇ	a palatal n.
త	t	dental or soft t, as the t in "winter." (The Italian t exactly.)
థ	t'h	aspirate of the preceding; as the t h in "ant-hill."
ద	d	soft d as the d in "daily."
ధ	d'h	aspirate of the preceding; as dh in "adhere,"
న	n	soft n, as the n in "fancy."
ప	p	as the p in "pardon."
ఫ	p'h	aspirate of the preceding, as p h in "up-hill."
బ	b	as the b in "number."
భ	b'h	aspirate of the preceding; as bh in "abhor.',
మ	m	as the m in "demand."
య	y	as the y in "yellow." (If without a vowel mark it is the vowel ఇ.)
ర	r	as the r in "round" and "burial"
ఱ	r	a peculiar vibrating r something like r in "crack."
ల	l	as the l in "manly."
వ	v	as the v in "marvel."
శ	's	an s, or rather sh, something like s in "surety."
ష	sh	as the full sh in "shoulder" and "lashing."
స	s	as the s in "sinful" and "wasting."
హ	h	as the h in "hunger."
ళ	l	a peculiar hard l; harder than l in "glover."
క్ష	ksh	as the ksh in "workshop."
ం	{ m	as the m in "cumber."
	{ n	as the n in "wonder."
ః	h	as the ch in the Scotch "loch."

(Note 1.*) ts* is the true Telugu sound of the letter చ; but it is used in Sanscrit derivatives for the Sanscrit letter *ch.* So *dz* is the true Telugu sound of the letter జ; but in Sanscrit derivatives it is pronounced as *j.*

N. B.—In the list of consonants in the native character, the vowel mark of *a* short, has been appended to each of the consonants to which it can be appended. This has been done to distinguish them from the 9 consonants which do not carry it, *viz:* k'h, gn, j, ñ, t, n, b, r, l. Hence the *English* equivalents are ka, k'ha, ga, g'ha, gn, &c.

TAMIL̲.

அ	a	as the a in "about" and "delta."
ஆ	ā	as the *long* a in "father."
இ	i	as the i in "pin," or the y in "truly." [*See Note*, 1.]
ஈ	ī	as the *long* i is in "pique." [*See Note* 2.]
உ	u	as the oo in "good."
ஊ	ū	as the *long* oo in "noon."
எ	e	as the e in "mendicant" (nearly the French è) [*See Note* 3.]
ஏ	ē	as the ey in "grey" (nearly the French ê.) [*See Note* 4.]
ஐ	ai	as the ai in "aisle," or ei in height."
ஒ	o	as o in "police."
ஓ	ō	as the *long* o in "story," or "prose."
ஔ	au	as the ou in "foul," or ow in "drown."
க	k or g	as k in "king" or g in "lagoon." [*See Note* 5.]
ங	n	as the ng in "angle."
ச	s	a peculiar s sounded nearly like ch. [*See Note* 6.]
ஞ	ñ	as the ni in "onion," or gn in "mignon."
ட	ḍ	hard or palatal d; stronger than d in "drum." It has a sound of t in it.
ண	ṇ	hard or palatal n.
த	t or d	as the t in "tinder," or d in "windy." [*See Note* 7.]
ந	n	soft n as the n in "fancy."
ப	p or b	as the p in "pardon" or b in "number." [*See Note* 8.]
ம	m	as the m in "demand."
ய	y	as the y in "yellow."
ர	r	as the r in "round" and "burial."
ல	l	as the l in "manly."
வ	v	as the v in "marvel."
ழ	l̲	a peculiar rolling sound: a mixture of r, l, and the French j.
ள	ḷ	a hard l; harder than l in "glove."
ற	ṛ	a vibrating r; something like r in "crack."
ன	n.	the same as the soft n above, but used as a "final."
ஷ	= Sanscrit sh.	
ஸ	= Sanscrit sibilant s.	

Notes.

(I.) இ (i) before ḍ ṇ ṛ ḷ ḻ is sounded like u ; as விடு leave, is pronounced *vudu*, not *vidu*.

(II.) ஈ (i) before ḍ ṇ ṛ ḷ ḻ is pronounced like the German üh, as வீடு a house, is pronounced *vühdu*, and not *vidu*.

(III.) எ (e) when initial, is generally sounded like *ye* ; and ஏ like *yé*. Thus ஏரி a tank is *yéri* and not *éri*, though the latter form should be adopted in a Glossary.

(IV.) ஏ é before ḍ ṇ ṛ ḷ ḻ is sounded like the German *oë* in Goëthe. As மேடு a rising ground, not *médu*, but *moëdu*, or nearly as if written in English *murdoo*.

(V.) க (k) as an initial is k. Thus காடு *kádu* a jungle. As a medial if *alone* it is g. Thus மகன் *magan* a son, (but in words taken from the Sanscrit, the t is preserved.) As a medial *double* it is k. Thus பக்கம் *pakkam* a side. As a final with a vowel, it is g. Thus படகு *padagu* a boat.

(VI.) ச (*s*) Though generally rendered by the English s when it is alone, the sound is more that of *ch*. Thus செய a field is pronounced more like *chey* than *sey*, though the latter form would be adopted in a Glossary. Thus *chinna* small, for *sinna*, &c. As a medial, if alone, it is more of the sibilant s, as மாசம் *māsam* a month. As a medial double the two form *ch*, as அச்சு, *achu*, a mould. As a final with a vowel, it is more sibilant as பசி *pasi* hunger. When ச follows ற (r) it is pronounced *ch*. As முயற்சி *muyarhi* effort. This letter supplies in Tamil the Sanscrit ch and s.

(VII.) த as an initial, is a soft like the Italian t. Thus துணி *tuni* a piece of cloth. As a medial, or a final with a vowel it is d ; thus கதவு *kadavu* a door, காது *kàdu* the ear. (N. B. This is to be distinguished from காடு kadu a jungle, with a hard d.) When double த்த is tt without any sound of th, as கத்தி *katti* a knife. As an initial த is used for the Sanscrit d'h.

(VIII) ப (p) as an initial is p. Thus பாடு *pādu* a song ; as a medial and alone, it has a sound of b, especially if following ம (m), as பாம்பு *pámbu* a snake. When double ப்ப=p, as தப்பு *tappu* a fault. As an initial, it is used for the Sanscrit b'h.

ட்ச=tch as மாட்சிமை *mátchimai*, excellence.

ஞ்ச=nj as அஞ்சு *anju* five.

ட்ட=ṭṭ (harder than த்த=tt) as ஆட்டுக்கால் *aṭṭukkāl* a sheeps foot.

ற்ற=ṯṯ (harder than ṭṭ) as ஆற்றுக்கால் *aṯṯukkāl* a water course.

HINDÚSTÁNÍ.

1. The romanizing system that I would propose, is based on Sir William Jones' method, and brought into very general use by Shakespear. The arrangement proposed by Professor Wilson in the introduction to his "Glossary of Official terms," mainly coincides with the above.

2. As Shakespear has been so long a well known authority, I would adhere to the spelling of Hindústání words that we find in his Dictionary with one or two slight modifications. They are as follows. 1st, I would use a different symbol for the ع; but of this more will be said presently. 2ndly, I would accentuate the (و) *ó* and the (ي) *é* because they are both *long* in Hindústání, and when we come to arrange an alphabet to suit Tamil̲ and Telugu as well as Hindústání, it will be necessary to show the difference between the long and short *o*'s and *e*'s. 3rdly, I would introduce the aspirate mark ' before an h following a consonant: as *b*'h instead of *bh*,—because the aspirate is peculiar to the original language from which Hindùstaní is framed, and needs to be sounded. 4thly, I would write the accents as in foreign European languages, *á é í* &c., instead of *ā ē ī* as Shakespear does.

3. Professor Wilson, is no doubt a high authority, especially as he has endeavoured to make his roman alphabet suit various languages besides Hindústání, and it is therefore as well to show where his system differs from Shakespear, and why I adopt *the latter*, (all except ʿ for ع)

		Wilson.	Shakespear.
1	ث	*s̤̬*	*s̤*
2	ذ	*ẓ*	*z̲*
3	ض	*z*	*ẓ*
4	ظ	*z̬*	*z̤*
5	ص	*s̤*	*ṣ*
6	ح	*h*	*ḥ*
7	خ	*kh*	*k͟h*
8	ه	*ḥ*	*h*
9	غ	*gḥ*	*g͟h*
10	ع	^	ʿ

4. With regard to the 5 first, Professor Wilson gives no reasons for this difference from Shakespear, but it is probably owing to his having arranged his roman letters *first* for Sanscrit, and when other *z*'s or *s*'s came in Persian and Hindústaní, he was obliged to adopt a new form. This is evident from his making *s* the equivalent for the Sanscrit श, and thus Shakespear's ṣ for ص was changed into s̤. In Southern India the Sanscrit श is sounded like "*Sh*" as in *Shiva*, and *Shrotriyam*, and I am inclined to write it *Ṣh*, especially as in Hindústání, it is represented by ش, and in Telugu by శ. Sir William Jones writes it *ś*, and so do many other Orientalists, and therefor I would adopt *ś*. Which ever way it is, the equivalent for ص better remain as Shakespear has it *viz.*, ṣ.

5. With regard to the letters ہ and ح; according to Shakespear the former is the common *h*, but the latter has a dot under it or *ḥ*. Wilson just reverses this, but with hesitation, as he acknowledges. I prefer Shakespear, not only as being established, but because a dot generally denotes a more *decided* sound, and this is the case with ح, which is sometimes sounded so strong that Europeans have written it *ch*, as in Achmet for Aḥmad. Sir William Jones distinguished it by an accent thus : *h́*.

6. With regard to خ; Wilson renders it *kh*, and thus makes no difference between it and کھ, whereas there is a very *wide* difference, as any one can hear in the pronunciation of خانہ a house, and کھانا food, or *k͟hána* and *k'háná*. Shakespear's distinction of *k͟h* to shew it is all one letter, I would preserve, though I admit it is not absolutely necessary if the aspirates are accentuated as recommended in para. 2.

7. With regard to غ much the same observations as above occur. Wilson says that it is a modification of *g*, and writes it *gḥ*; but this is mere matter of taste, and no inconvenience can result from the well known equivalent used by Shakespear *viz.*, *g͟h* and so distinguishing it from *g'h*.

8. With regard to ع, that letter will be separately considered in an Appendix to this memo.

9. I would not use *italics* at all. They may answer as distinctive marks in printing; but in writing to underline letter, might denote either a diacritical mark, or an italic; and it might be doubtful which.

10. In ordinary writing, the following marks might be omitted: the dots underneath, to distinguish *d* from *ḍ*,—*s* from *s*—*z̲* from *z* and *ẓ*,—*ṭ* from *t* and *ṭ̈* &c.; but I would retain the aspirate in *k'h b'h* &c.; unless it were arranged to use *k̠h* and *g̲h̲* for خ and غ. The long vowel accents should be retained, as also the mark over *ś* for the Sanscrit श. The mark representing ع might also be omitted in common writing.

The above concession does not at all diminish the expediency of framing rules, whereby to write in Roman character, with diacritical points, the Eastern languages. In grammars and dictionaries the strict rule should be adhered to, and also in books printed throughout in the Roman character. The Roman rendering should be such, that one conversant with the rules, should be able to convert the words written or printed in that character, into their *original* character. That is the test of a correct method; and of course in this case, *all* the diacritical points are required to be used.

I now proceed to offer in an Appendix, my remarks on the rendering of ع.

APPENDIX.

Rendering of letter ع.

1. The rendering in roman character of the letter ع, has as Wilson observes, "always constituted a difficulty."

2. Shakespear's rule, is that when initial in a syllable, it is represented by ٭ (which is its medial form) placed over the vowel which follows it in pronunciation. Thus عَرضي = *arzi*, معافي *mu'āfī*; but when it is *not* initial in a syllable, (*i. e.* when it has a *jazm* over it) the ٭ is placed after the vowel which precedes, as معمول = *ma٭mūl.* It will be observed that when ع *precedes* a vowel, Shakespear precedes *it* by an aspirate mark, (as in *mu'āfī* above) to which he does not allude in his explanation.

3. Wilson states that Sir W. Jones in his Memoir, "proposed to distinguish it by a *circumflex,*" and adopts that plan himself.

4. Richardson in his Persian Dictionary, as also Johnson, use the Arabic letter itself.

5. In the proposed "Missionary Alphabet" it is proposed to render it *'h.*

6. In the Calcutta papers of 1835-36 re-printed in London 1854, it is proposed to render it by a dot under the vowel to which it is attached.

7. Dr. Lipsius in his "Standard Alphabet," objects to the circumflex over, or the dot under the vowel, as indicating a change in that vowel, whereas ع is a full consonant, and is distinct from a vowel. He indicates it by ̔

8. All these differences shew that the rendering of this letter requires consideration.

9. In the first place it is to be borne in mind that the letter is purely Arabic, and by Arabic grammarians considered a *consonant.* Under no circumstances can it be considered a *vowel,* if only for this season, that it requires to be surmounted by or subscribed with, one of the three vowel mark, in order to its constituting a syllable.

10. Sir W. Jones, and Wilson's plan of the *circumflex*, will first be considered ; 1st, where it is initial in a syllable : take the following examples :—

Wilson and Jones.

عرضي ârzì

عام âmm

عزت îzzat

عيد îd

عين âin

11. It is contrary to all usage to write anything above the place where a letter is to come, before writing the letter itself ; and if the circumflex is used to represent ع, the reader is required to suppose in cases like *ârzî* and *îzzat*, that the circumflex was written *before* the subjacent letter.

12. Again where the ع is *not* initial.

Wilson and Jones.

إعتبار îtibàr

دعوى dâwà

معمول mâmùl

13. In all these cases, the ع has *no vowel mark* over or under it, but on the contrary, a *jazm*, in order to shew that it is quiescent. In these cases what vowel can the *circumflex* be 'circum' to, seeing that there is no vowel in the original syllable ? *i^tibàr, da^wá, ma^múl,* would be the only consistent method, if ع = but then the *circumflex* would be *over* nothing ! To place it over the *preceding* vowel, is to put it into a syllable to which it does not belong.

14. Again the circumflex over a vowel, is (as stated in para. 7), apt to mislead ; for it would be supposed that by it the vowel was made broad, as in the French *fête*. Thus

Wilson would write *mâmúl,* and *nâlband,* leading to the supposition that the mark denoted a *long a ;* whereas the *a* in both words is *short,* though it is true that this *a,* which precedes the ع, is *with* the ع sounded as in English *aa* or with a lengthened sound. So Wilson spells عالي and علي the same, namely âḷì ; whereas the former means *lofty,* and the latter the name of *Muhammad's son-in-law.*

15. Again the circumflex stands in the way of a long vowel accent. Thus in the word عيد a festival, the *i* is *long,* but Wilson writes it "*îd* or *âid,*" (ínstead of ^*íd,*) as if he were puzzled how to manage it. So he renders عادل by *âádil,* thus as before departing from his own rule, that ع is represented by a circumflex ; for in this case it is represented by *â,* or *both* circumflex and vowel. Other discrepancies are also observed. Thus إطلاع he writes *itlâ ;* here the ع is again *both* circumflex and vowel. The same *î* that is used for the long *i* in *îd* is used for *îzzat* عزت where it is short. (See para. 10.) Again ربيع is written *rabiá,* where ع is again represented by *â ;* and this in a word in which there is no sound of terminal *a* at all. Still he writes *jámî* for جامع which if *rabíá* is right, should be *jamiá.*

16. Shakespear's plan is objectionable on the same ground as Wilson's, so far as the initial is concerned. (See para. 11). The symbol must always have the appearance of having been superscribed *after* the completion of the vowel, and the *initial* position of the ع is apt to be overlooked. It is also objectionable inasmuch as it is used *over* a vowel like an accent, whereas it is a consonant, and should have its *proper place* in the word.

17. Besides this, the symbol ﻌ can hardly be called the ع, for it is only the *medial* form of it ; also it is ill adapted to long vowels, if they are accentuated in the usual fashion.

Thus í á̕ i̕s awkward. Shakespear's ̕ has these advantages over the circumflex : first, it is not an accentuation mark : and secondly, it is written according to a fixed rule. My own opinion is much in favor of the original Arabic letter inserted in its proper place, especially as a medial. Thus *عain, maعmúl, khilعat, inعám, zilaع*&c. There is no typographical difficulty, and Johnson's Persian Dictionary, —a standard work—has it throughout. A Turkish Grammar printed in London during the Crimean war, also contains it. I have had the letter cast in Madras and used it in type easily and cheaply. This is no doubt the *most correct* method of rendering ع ; but for the sake of expediency, I would not press it. Many would find it awkward to write, and it has an uncouth aspect by the side of roman letters.

18. I would therefore substitute for it the *head* of the letter, namely ˤ; (or a reversed comma might do), and elevate it above the other letters.

	Shakespear.	Wilson.	Proposed.
عرضي	ārẓī	ârẓí	‘arẓí
عام	āmm	âmm	‘ámm
عيد	īd	îd	‘íd
عين	ain	âin	‘ain
رعيت	ra'aiyat	râiyat	ra‘aiyat
تعلق	ta'alluk	taâlluk	ta‘alluk
خلعت	<u>kh</u>il'at	khilât	<u>kh</u>il‘at
انعام	in'ām	inâám	in‘ám
تعينات	ta'īnāt	tâínát	ta‘ínát
معين	mu'aiyan	muâ in	mu‘aiyan
معمول	ma mūl	mâmūl	ma‘múl
تابعدار	tābiˤdár	tábîdár	tábi‘dár
جمع	jamˤ	jamâ	jama‘
ضلع	zilˤ	zilâ	zila‘
ربيع	rabīˤ	rabíâ	rabí‘
اطلاع	ittilā	ittiláâ	ittilá‘

Consonants.

ب	b	as the *b* in "number."
پ	p	as the *p* in "pardon."
ت	t	dental *t*, as the *t* in "tub."
ٹ	ṭ	palatal *t*; as the *t* in "trumpet."
ث	s̤	A peculiar lisping *s*.
ج	j	as the *j* in "jelly."
چ	ch	as the *ch* in "church."
ح	h	hard *h*; like *h* in "haul."
خ	<u>kh</u>	a guttural *kh*, like the German final *ch*.
د	d	dental *d*, as the *d* in "duty."
ڈ	ḍ	hard or palatal *d*; as the d in "drum" or "dull."
ذ	*z*	as the *z* in "razor."
ر	r	as the *r* in "fairy."
ڑ	ṛ	a hard vibrating *r*; often used for the hard *d* above.
ز	z	as the *z* in "hazard."
س	s	as the *s* in "sinful."
ش	sh	as the *sh* in "shoulder."
ص	ṣ	The same sound as *s*.
ض	ẓ	The same sound as *z*.
ط	t̤	Hard *t*.
ظ	z̤	Hard *z*.
ع	ʻ	A peculiar arabic *a*.
غ	<u>gh</u>	A peculiar arabic guttural.
ف	f	as the *f* in "fin."
ق	ḳ	a clicking palatal *k*.
ک	k	as the *k* in "king."
گ	g	as the *g* in "legation."
ل	l	as the *l* in "relief."
م	m	as the *m* in "market."
ن	n	as the *n* in "denote."
ں	ṅ	Final and nasal *n*; as in the French "bon."
و	w or v	as the *w* or *v* in "wisdom" and "device."
ه	h	as the *h* in "hand." As a *final*, it has a

erceptible sound if preceded by a vowel, and is then written in Roman character; but otherwise the final h is neither ounded nor written. Thus درگاه is written *dargáh*: دره a

Village, is *dih;* but نامہ a writing, is *námá.* Thus there is a distinction between دانہ *dána* grain, and دانا *dáná* a sage.

N. B.—The Hindí *aspirate* or *h* has been adopted in the Hindústání language, by adding the ordinary h to the several consonants thus:

بھ	b'h
تھ	t'h
ٹھ	ṭ'h
پھ	ph
چھ	ch'h
دھ	d'h
ڈھ	ḍ'h
کھ	k'h
گھ	g'h
جھ	j'h
ڑھ	ṛ'h

It is proposed to separate these letters by an aspirate, to distinguish them from *ch, kh* and *gh* which are each one letter, and to prevent the erroneous pronunciation of the th and ph which would occur to English readers. Thus خانہ *kháná* a house and کھانا *k'háná* food, have a very different pronunciation of the first syllable.

The Arabic *alif-i-maksúra* which terminates some words, is generally rendered in Hindústání by ا ; thus فتوی is فتوا or *fatwá.*

Vowel Marks.

1. *Zabar* or *fat'ha:* the mark above the consonant to which it belongs, and equivalent to *a* short. Thus قَلَم *kalam* a pen. It is generally omitted in ordinary writing.

2. *Zér* or *kasra;* the mark below, equivalent to short *i;* as خِدمت *khidmat*, service.

3. *Pésh* or *zamma,* the mark ُ above, equivalent to short *u* as پھُول *p'hul* a flower.

4. *Hamza,* the mark ء above. It is a mere compression of the voice, and in Roman character, is designated by an aspirate. It is seldom met with except between long *á* and long í. Thus امرائي *amrá'í* an orchard, آئين *á'ín* a statue or law. In some cases the long *i* is converted into short *í*, as آزمائيش *azmá'ish* instead of *azmá'ísh* trial; قايم *ká'im* instead of *káím* fixed; فائده *fá'ida* instead of *fá'ída* profit. In this case it is called *hamza i mulaiyana,* or softened *hamza.*

5. *Tash'díd,* the mark ّ above, shewing that the letter under it is doubled.

6. *Jazm,* the mark ْ above, shewing that the letter under it is *sàkin* or inert: that is, having no vowel to be sounded after it. Thus قَبْر *kabr* a tomb, اِسْم *ism* a name. These words, if there were no *jazm,* would be *kabar,* and *ísam.* So قَلَم *kalam* a pen, if written قلم would be *klm.* Thus كسر *kasr* breaking, كَسب *kasab* a trade. The last letter of a word is always inert, and the jazm always understood.

Vowels.

7. *a* short; as the a in 'volatile.' This sound is supposed to commence every syllable, unless the *jazm* occurs. (para. 6.) The *initial* alif is the only instance where the written ا is pronounced short. N. B. When the unwritten

a short is followed by ع, it is generally pronounced long or like a double *aa*, in consequence of the deepening sound of the ع. Thus مَعمُول *ma^cmúl* pronounced *mámúl* custom. So تَعَلُّق *ta'allúk* pronounced *tálluk*, a division of a district; نَعل *na^cl* a nail, pronounced *nál*.

8. *a* long, as the a in 'father.' As an initial it is آ, or *alif-i-mandúda*, or prolonged *alif*. As a medial or final, it is ا without the circumflex, as نالا *nálá* a watercouse.

9. *i* short; as the i in 'single.' This is simply the *zér* (para. 2.) Thus the word اِجارا *ijárá* a lease خِلعت *khil^cat** a dress of honor.

10. *i* long; as the i in 'pique.' This is the *yá*† with the *zér* under and preceding it, ِي. It is called the *ya-i-ma^crúf* or known ya, this sound only being known in Arabic: as مِيراث *míras* heritage. As an initial it is اِي, thus اِيران *I'rán* Persia.

11. *é* long; as the ei in 'neighbour.' (There is no *short* e in Hindustání.) It is called *yá-i-maj'húl* or unknown, as it is a sound not known in Arabic. It is distinguished from the *i* of para. 10, and the *ai* of para. 12, by having no vowel mark, either above or below. Thus تيل *tél* oil. As an initial it is اي, as ايک *ék* one.

12. *ai*, as the ai in 'aisle.' It is the *yá* with a *zabar* over and preceding it, and thence called *yá-i-sákin mà kabl maftúh*, or *ya* quiescent with a preceding *fat'ha*. Thus مَيدان *maidán* a plain. As an initial it is اَي; So اَيسا *aisá* such.

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* With reference to the N. B., of para 7, it will be observed that in this word, the ع *preceds* the a, and the a is *not* lengthened.

† The letter ي is sometime consonant y, as when united with و as ياد *yàd* memory فرياد *faryàd* complaint. Words ending in يت preceded by long *a* or long *i* are pronounced as *yat*. Thus پنچايت *pancháyat* a meeting of Arbitrators قبوليت *kabúliyat* an agreement.

13. *u* short; as the u in 'fulsome.' This is simply the *pésh* (para. 3,) as مُلک *mulk* a kingdom. As an initial, it is اُ; as اُستاد *ustád* a teacher.

14. *ú* long; as the oo in 'fool.' It is the و *wáo** with a *pésh* over and preceding it, or *wáo maᶜrúf*, or known *wáo*. Thus ضرُور *zarúr* necessary. As an initial it is اُو but hardly any Hindústání words begin with it.

15. *ó* long; as the o in 'bony.' (There is no short o in Hindústaní.) This is called *wáo maj'húl* or unknown *wáo*, as it is not used in Arabic, though common in Persian. It is distinguished from the *ú* of para. 14 by having no vowel mark attached. It is not used as an initial. N. B. When *wáo* follows خ it is written but not pronounced; and then it is distinguished in Roman characters, by w. Thus درخواست darkhwast a proposal. This *wao* is called *wáo-i-maᶜdúla* or the passed-by *wáo*.

16. *au;* as ou in 'bound.' It is the *wáo* with the *zabar* over and preceding it. Thus قَول *kaul* permission; نَوکر *naukar* a servant. As an initial it is اَو as اَولاد *aulád* offspring, اَور *aur* and. It is called *wáo-i-sákin má kabl maftúh*, for it is quiescent, and follows *fat'ha*. (See para. 12.)

W. H. Bayley.

* The letter و is also used as a consonant.

THE FOLLOWING ARE 163 WORDS OF COMMON OCCURRENCE.

Common Spelling.	*Correct Spelling.*	*Common Spelling.*	*Correct Spelling.*
Abkarry	Ábkárí	Chavedy	S̱ávaḍi
Adawlut	ʿAdálat	Chellaun	Chalán
Amauny	Amání	Chillum	Chilam
Ameen	Amín	Chittah	Chiṭṭ'ha
Anna	Áná	Chokra	Ch'hókrá
Annicut	Aṇaikaṭṭ(u)*	Chop	Ch'háp
Ayen	ʿAin	Chowky	Chaukí
		Chuckler	S̱akkiliyan
Bagayet	Bag̲h̲áyat	Chuckrum	Chakkaram
Banghy	Bahangí	Chuttrum	S̱attiram
Bareez	Bérij	Circar	Sarkár
Batta	B'hata	Clashie	Ḵhalásí
Beegah	Bíg'há	Coil	Kovil
Bhutverty	B'haṭṭvarṭṭi	Coir	Kayiṛ(u)
Bowry	Báórí	Conjee	Kánji
Bramin	Brahman	Conicopoly	Kaṇakkapiḷḷai
Brinjarry	Banjárá	Coochel	Kuchchela
Buckreed	Bakrʿíd	Cooltee	Kult'hi
Bund	Band	Cooly	Kúli
Bunjeer	Banjar	Coonchum	Kuncham(u)
Byraghee	Bairágí	Cotaur	Kót'hár
		Cowle	Ḳaul
Cabooleat	Ḳabulíyat	Crore	Karór
Calingulah	Kalingal	Cullum	Kaḷam
Candy	Kaṇḍi	Chullm	Kalam
Carcoon	Kárkun	Cumly	Kambali
Cash	Kásu	Cummerbund	Kamarbund
Catamaran	Kaṭṭamaram	Curnum	Karaṇam(u)
Cavilgar	Kávalkár(an)	Cusbah	Kaṣba
Cawnie	Káṇi	Cuscus	Khask̲h̲as
Cazee	Ḳáẓí		

* The terminations in parentheses, though correct as to letters, are not sounded and might be omitted in writing.

Cutbuddy	Kaṭṭubaḍi
Cutcha	Kachchá
Cutcherry	Kach'harí
Dacoit	Dakait
Dawk	Ḍák
Deccan	Dak'han
Deloyet	D'haláyat
Dewan	Díwán
Dholl	Dál
Dhony	Dóṇi
Doodie	Duḍḍu
Dooly	Dúlí
Dowle	Ḍaul
Duffedar	Dafaʿdár
Dufter	Dafter
Durgah	Dargáh
Durkhast	Darkhwást
Durma-curta	D'harma-kartá
Dusserah	Das'hará
Durzee	Darẓí
Eedgah	ʿÍdgáh
Enam	Inʿám
Fakeer	Fakír
Foujdary	Foujdárí
Fusly	Faṣlí
Fussul	Faṣl
Fysil	Faiṣal
Garce	Garisa
Gharry	Garí
Ghaut	G'hát
Ghee	G'hí
Ghurree	Gar'hí
Ghurry	G'hárí

Ghyre	Ghair
Godawk	Gudák(u)
Goolee	Guḷi
Goomastah	Gumáshta
Goonta	Guṇta
Goor	Guṛ
Guddee	Gaḍḍí
Gunny	Ganní
Harem	Ḥarím
Hejira	Ḥijra
Hircarrah	Harkára
Hookum	Ḥukm
Hoondee	Hundí
Hoozoor	Ḥuzúr
Howdah	Hauda
Hungamy	Hangámí
Jaghire	Jágír
Jemmadar	Jamaʿdar
Jeroyety	Ziráʿtí
Jummabundy	Jamaʿbandí
Kayem	Ká'im
Khureetoo	Kharíṭa
Kincob	Kimkhwáb
Kyput	Kaipaṭṭ(u)
Lac	Lák'h
Lascar	Lashkar
Layek	Lá'ik
Loot	Lúṭ
Lubbay	Labi
Mafee	Muáfí
Mahomet	Muḥammad
Maistry	Mistrí

Mamlutdar	Muʿámalatdár
Mamool	Maʿmúl
Marahmut	Marammat
Masalchee	Mashʿálchí
Mauniem	Mániyam
Meerassy	Míráṣí
Merah	Mérai
Mercal	Marakkál
Mocassah	Mukhása
Mofussil	Mufaṣṣal
Mohturfa	Muḥtarafa
Mohunt	Mahant
Mohur	Muhar
Mohurrum	Muḥarram
Momety	Momaʿi*
Monigar	Maṇiakár(an)
Moochee	Móchí
Moochilka	Muchalka
Moofty	Muftí
Moolgueny	Múlgaini
Moollah	Mullá
Moolvy	Maulaví
Moonshee	Munshí
Moonsiff	Munṣif
Moosulman	Musalmán
Mootah	Muṭ'hṭ'ha
Mootasuddy	Mutaṣaddí
Moplah	Mápiḷḷa
Moyen Zabitah	Muʿaiyan Zábiṭa
Muzoondar	Majmúʿdár
Motabar	Muʿtabar
Mouzah	Mauzaʿ
Mushrooty	Mashrúṭí
Musjeed	Masjid
Musnud	Masnad
Mutt	Maṭ'h
Nacoda	Nákhudá
Naigue	Náyak
Nair	Náyar
Natcheny	Nachini
Nautch	Nách
Nerrick	Nirkh
Nicka	Nikáḥ
Nullah	Nálá
Nunjah	Nanṣey
Nuzzer	Naẓr
Olluck	Aḻák(ku)
Oolcoody	Úlkuḍi
Oolgunoo	Oḻungu
Oomedwar	Úmmédwár
Oordoo	Urdú
Ooroos	ʿUrs
Parcherry	Paṛaichéri
Pariah	Paṛaiyan
Pergunnah	Pargana
Perumboke	Puṛambók(ku)
Peshcush	Péshkash
Petta	Péṭṭai
Pie	Páí
Pindarry	Pend'hári
Poligar	Palaiyakár(an)
Pollum	Palam
Poonjah	Punṣey
Pooty	Puṭṭi
Paracoody	Parakuḍi
Potail	Patél
Pucka	Pakka

Puckally	Pak'hálí
Puddy	Paḍi
Puddial	Paḍiyál
Puggree	Pagrí
Punchayet	Pancháyat
Punkah	Pank'ha
Purdah	Parda
Purwannah	Parwána
Putcut	Paṯṯukaṭṭ(u)
Puttah	Paṭṭá
Pyacarry	Payakárí
Pygusht	Paigast
Pymash	Paimá'ish
Raggy	Rágí
Razeenamah	Rází-náma
Reyayet	Riʿáiyat
Rissaldar	Risáladár
Rowannah	Rawána
Russoom	Rusúm
Saderwared	Ṣádirwárid
Sagoobuddy	Ságuba
Salastry	Sálótarí
Sayer	Sá'ir
Seacunny	Sukkání
Seer	Sér
Sepoy	Sipáhí
Serang	Sarhang
Sevoy-jumma	Siwá'i-jama
Shaikal	Seykkál
Shavy	Sávi
Sheristadar	Sarrishtadár
Sheeah	Shíʿah
Shroff	Ṣarráf
Shrotrium	Srótriyam
Sibbendy	Sibbandí
Sicca	Sikka
Silledar	Silaḥdár
Soobah	Ṣúba
Sotuntrum	Swatantram
Soucar	Sáhúkár
Sowar	Sawár
Sudder	Ṣadr
Sunnud	Sanad
Suttee	Satí
Takeed	Tákíd
Taliary	Talaiyárí
Talook	Taalluḳ
Tannah	T'hán
Teerwa	Tírvai
Thug	T'hag
Thasildar	Tahsíldár
Tindal	Tandel(u)
Toom	Túm(u)
Toondoovarum	Tuṇduváram
Totacal	Tóṭṭakál
Tuccavy	Taḳáví
Turrufdar	Ṭarafdár
Turrum	Taram
Tusdeek	Taṣdíḳ
Tynaut	Taʿínát
Urzee	ʿArẓí
Ussul	Aṣal
Vakeel	Vakíl
Vaylie	Véli
Veesabuddy	Visabaḍi
Viss	Vísai
Wooliem	Úḻiam

Wudder	Oṭṭan*	Zabitah	Ẓábiṭa
Wurg	Varga	Zemindar	Zamíndár
Wussul	Waṣul	Zillah	Ẓila'
Yadast	Yáddásht	Zuft	Zabṭ
Yeomiah	Yaumia		

The following words though mis-spelt, have almost become European.

Arrack	Araḳ	Hopper	Appam
Bandy	Banḍi	Jelly	Salli
Bungalore	Bánglá	Jungle	Jangal
Chatty	S̄aṭṭi	Maund	Manangu
Cheroot	S̄uruṭṭu	Rupee	Rúpíya
Chunam	S̄unnámbu	Ryot	Ra'aiyat
Curry	Kaṛi	Teapoy	Tí-ṇpá'í
Dubash	Dó-b'háshí	Toddy	Táṛí
Fanam	Paṇam	Tope	Tóppu
Godown	Giḍangu	Jaggery	ar kkari

"DIVISIONS" OF THE MADRAS COLLECTORATE.

Veysarpady	Veyásarpádi	Chintadrapett	Sintádiripéttai
Perumbore	Perambúr	Chepauk	Sépákkam
Vepery	Véperi	Poodoopaukum	Pudduppákam
Pursewaukum	Pursaipákkam	Mylapoor	Myilápúr
Kilpauk	Kíḻpákkam	Royapoorum	Ráyapuram
Chetput	Séttupaṭṭu	Tondiarpet	Tándaiyárpet-tai
Ellumbore / Egmore	Eḻambúr		

* Pl. Oṭṭar.

APPENDIX C.

Memorandum to accompany a proposed scheme for the representation of native names and words in the English character.

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1. It is, I think, needless to argue the necessity of *some* systematic way of representing native names in the English character. All will probably admit the desideratum. The accompanying scheme shews the Alphabet which I would propose to adopt for the representation of the five principal languages of the Madras Presidency, and Sanskrit. The latter is added, as Sanskrit words are so largely adopted into all the Madras languages.

1 Tamil.
2 Telugu
3. Malayàm.
4 Canarese.
5. Dakhani; or the dialect of Hindüstàní spoken in the South.

2. I am aware that the proposed Alphabet, as it stands, is not the best or most simple way which could be devised for representing the character of any one of the five languages; but as it is doubtless desirable to have one Roman-Alphabet for *all* the native languages of the Presidency, sacrifices have been made to attain this end; and my endeavour has been to devise a way of representing six native Alphabets with as much simplicity as is consistent with critical correctness.

3. I earnestly hope for the early attention of Government to the subject with a view to the speedy adoption of this or *some* plan. The careless and unintelligible way of representing native names is a great and increasing evil. I may instance the Yomiah

Vide List B.

allowance Lists which came up the other day from the Board of Revenue, and are now being printed. Many of the names are utterly unintelligible, and many more only to be distinguished by a series of guesses.

4. I would beg to suggest that all departments under Government be directed rigidly to adhere to the scheme now circulated, (or that which may ultimately be adopted) in representing all native names in their Official Papers, from the commencement of the approaching Revenue year (1st July 1859). This will give writers, &c., ample time to master the details of the scheme. Something like the following short instructions might be issued.

I. In writing native names and words, no letters are to be introduced which do *not* exist in the original. For example the use of *h* at the end of proper names as Ramaya, Rámappa, now so common, is wholly inadmissible.

II. The letters which *do* exist in the original are to be expressed according to the accompanying scheme.

III. Names of Districts, and other names which have been thoroughly Anglicized, as *for example* those in the annexed list, are to be written as usual without alteration. When a doubt exists as to whether a word has been thoroughly-Anglicized, it is to be given in the correct form.

A.

5. I would solicit attention to the fact that the change will not be nearly so great, as a glance at the tabular statement would lead one to suppose. The more complicated symbols are of comparatively rare occurrence ; and the only diacritical points which often occur are the dots underneath the hard letters, and the accents over the long vowels—to introduce these will surely be a most simple matter.

6. It appears advisable to notice an objection made by an officer whose opinion would from his position seem at first sight entitled to weight. I do this in case the same opinion may be held by others ; though this is, I hope, scarcely

probable, as it is merely the offspring of prejudice and not of conviction. It is said that "if the orthography of names is "altered, the names in their amended form, will not be identifiable with themselves as they stood previous to emendation." I reply that there is no definite plan of spelling names in use for which it is proposed to substitute another definite plan. There is no existing fixed method of representing words, a departure from which would endanger their recognition. What is proposed now, is to *establish* a definite plan, instead of allowing each name to be written according to the fancy of the writer, and his ideas of the force of letters and the pronunciation of what he writes. No objection is made to perpetual contortions and uncouth changes of form which it is impossible to deny take place now in writing names, scarcely any one being presented twice in the same garb; no fears are expressed of non-recognition now, but most unaccountably, if it is proposed to make a change on certain fixed principles once for all, it is objected that the words so changed will not be identified. I would ask if this has been found the case in the N. W. P. where a correct orthography has been attempted, or whether it is consistent with reason and common sense to suppose that it ever will be?

See List B.

7. I conclude with another expression of an earnest hope that steps may at once be taken in the matter.

M. NORMAN,

Deputy Secretary to Government.

Bangalore,
March 12th 1859.

A.

Anna.	Cooly	Pie.
Anicut.	Dacoit.	Pice.
Batta.	Harem.	Poligar.
Cash.	Jaggery.	Rupee.
Catamaran.	Lascar.	Ryot.
Chuckler.	Maistry.	Sepoy.
Coir.	Mohur (the coin).	Shroff.

And perhaps the most common weights and measures may be added as viss, ollock, &c.

B.

Correct spelling.	*Spelling in the Proceedings of Govt.*	
Rabí ul awal............	Rabee oo lawl.	
? unintelligible.......	Wrüjianul nissa.	
Jánakí......................	Jawnaky. Johnke.	
Tirupanantál...........	Trippendal.	
Bilmokṭá..................	Bilernetah.	
'Achári......................	Auchaury. Charry. Chary. Auchary, Aucharry.	
Malsar.....................	Muleers.	
?	Vellairgh.	
Purushóttamapuram...	Prosutpoor !	
Vriddháchalam.........	Veerootachellam, &c. *ad infinitum.*	
Mangalagiri............	Mungulyirry.	Extract Minutes Consultation, 30th April 1857, No. 830, Revenue Department.
Ténáli......................	Jenally.	
Répalli....................	Rasilly.	
Ḳádir......................	Khawder, Khader. Khawther, Cader. Cawder. Kawder. Kauder, &c , &c.	
Kuḷḷan....................	* Quilon.	

* So corrupted I suppose because Kuḷlan is something like *Kollam* a town in Travancore which is called by Europeans Quilon! ...	Minutes Consultation, Public Works Depatment, 22nd April 1857, No. 751.
Bhawáni..................	Bohwanny. Bowanny. Bhowaney. ———ay. Bawany, &c., &c.
Váganai..................	Vaugany, Vaughaunay.
Véda vritti..............	Vedah varthe. Vada vurthe. Veda virthee. Vada verte, &c.
Gurukkaḷ.................	Goorkul, Goorookul.
Malaiyapuram..........	Mullapooram. Mallaiyapooram. Malaprom. Mulapoorum. Mullapooram &c.
Mágánam.................	Máhanom.
Kánún......................	Kaunnoon.
Hurmat un nisá.........	Hoor Muttoo Missal.
Mahtáb khor	Mootah Kanar.
Mudu krishnaiyangár.	Mootookristin Engar.
Tirumalai 'Achári.......	Teroomulah Charry. Trimul Auchary. Thirmalah Charry. Thiroomul Chary.
Ranjangarh..............	Runjanagoody. Runjungada. Runjengeddy. Runjnegudd. Runjungode. Rungangudda.
Sáṭgaḍa....................	Sautghyr.
Phala nashṭam..........	Falamuptum.
Unintelligible; either Abú Turáb; or Abhùta Radzu...........	Abotoorah. Ahboothooraz. Abootoora.

Ḳásim	Cossim Kohsum. Cassim. Cawsim. Kawsim, &c., &c.	
Ibráhím	Ebrahkeem.	
Unintelligible; perhaps Sabdattuppadapporuḷ சப்தத்துப்பதப்பொருள்	Sytuttoopu-dappore.	Extract Minutes Consultation, 22nd October 1857, No. 1508, Public Department.
Brahmadèsam	Bremadasom. Brumma—— Bromma——	

Sanskrit. (Devanágari)	Telugu.	Karnáta.	Malayálam.	Tamil.	Persian and Hindústáni.	Proposed Roman Equivalent.	Remarks and Explanation.
अ	అ	ಅ	അ	அ	ا ا	a	I deem it unnecessary to enter into argument to show how impossible it is to represent the Vowels of the Oriental Alphabets in the Roman character, if the English standard of pronunciation be adopted I will merely state that the force possessed by the *Italian* vowels is to be given the "Roman equivalent" in Col. 7.
आ	ఆ	ಆ	ആ	ஆ	آ آ	á	
इ	ఇ	ಇ	ഇ	இ	اِ	i	
ई	ఈ	ಈ	ഈ	ஈ	اِي يـ ي	í	
उ	ఉ	ಉ	ഉ	உ	اُ	u	
ऊ	ఊ	ಊ	ഊ	ஊ	اُو وُ و	ú	
ऋ	ఋ	ಋ	ഋ	—	—	r̲i	
ॠ	ౠ	ೠ	ൠ	—	—	r̲í	
ए	ఎ	ಎ	എ	எ	اِي يـ ي	e	
—	ఏ	ಏ	ഏ	ஏ	—	é	
ऐ	ఐ	ಐ	ഐ	ஐ	اَي	ai	I prefer ai to ei, as, first, less likely to be mispronounced, and 2ndly, because it represents more nearly the *nature* of the vowel.
ओ	ఒ	ಒ	ഒ	ஒ	او و	o	

Sanskrit. (Devanágari.)	Telugu.	Karnáṭa.	Malayálam.	Tamil.	Persian and Hindústáni.	Proposed Roman Equivalent.	Remarks and Explanation.
ओ	ఓ	ಓ	ഓ	ஓ	—	ó	
औ	ఔ	ಔ	ഔ	ஔ	اَو	au	
क	క	ಕ	ക	க	ک ک ک	k	
ख	ఖ	ಖ	ഖ	க	کھ	kh	I strongly object to k̲'̲h̲, as I see no use in the apostrophe. So in the case of the other aspirated letters.
ग	గ	ಗ	ഗ	க	گ گ گ	g	
घ	ఘ	ಘ	ഘ	க	گھ	gh	
ङ	ఙ	ಙ	ങ	ங்	—	n̲	This n̲ is almost always mute, as is likewise ஞ in Tamil. It may therefore at option be expressed by n only. But when followed by a vowel the distinctive dots and line must be added, as இங்ஙனம் inn̲anam, in this manner; n̲áyiru̥, the sun. When followed by a consonant the class of n will be known by the consonant following: thus ங only will precede க and ஞ only, ச.
च	చ	ಚ	ച	ச	چ چ چ	ch	
छ	ఛ	ಛ	ഛ	ச	چھ	chh	
ज	జ	ಜ	ജ	ச ஜ	ج ج ج	j	
झ	ఝ	ಝ	ഝ	ச	جھ	jh	

ञ	ఞ	ಞ	ഞ	ஞ	—	(n̤) n	As kanji, கஞ்சி rice water; ஞாயிறு nayiru, the sun. Mal. കുഞ്ഞ് kunna, the young of animals.
ट	ట	ಟ	ട	ட	ٹ ٹ	ṭ	
ठ	ఠ	ಠ	ഠ	ட	ٹھ	ṭh	
ड	డ	ಡ	ഡ	ட	ڈ ڈ	ḍ	
ढ	ఢ	ಢ	ഢ	ட	ڈھ ڈ	ḍh	
ण	ణ	ಣ	ണ	ண	—	ṇ	When in Hindustáni, Sanskrit words containing this letter require to be expressed, the ن may be represented by ṇ though there is no distinct symbol for hard n in the language. As سورن savarn "of the same class with."
त	త	ತ	ത	த	ت ة ت	t	
थ	థ	ಥ	ഥ	த	تھ	th	
द	ద	ದ	ദ	த	د د	d	
ध	ధ	ಧ	ധ	த	دھ د	dh	
न	న - ౝ	ನ	ന	ந-ன	ن ن	n	
प	ప	ಪ	പ	ப	پ پ پ	p	
फ	ఫ	ಫ	ഫ	ப	پھ پ پ	ph	
ब	బ	ಬ	ബ	ப	ب ب ب	b	

Sanskrit. (Devanágari)	Telugu.	Karnáta.	Malayálam.	Tamil.	Persian and Hindústáni.	Proposed Roman Equivalent.	Remarks and Explanation.
भ	భ	ಭ	ഭ	ப	بھ	bh	
म	మ	ಮ	മ	ம	م ـمـ ـم	m	
श	శ	ಶ	ശ	ச-ஶ	ش ـشـ	sh	(The letter ஶ does not exist in the Tamil alphabet proper. It is a Grantham letter.) In Hindustani both س and ش are used to represent the sanskrit श as سو or شو siw, or shiw, the god Shiva.
ष	ష	ಷ	ഷ	ஷ	ش شـ ـشـ	<u>sh</u>	Likewise ش represents both hard and soft sh; *i. e.* sh and sh; as شماري shumárí, computation; koshish, كوشش endeavour; but كرش karsh agriculture.
स	స	ಸ	സ	ச ஸ	س ـسـ ـس	s	ஸ is a Grantham letter, not existing in the Tamil Alphabet proper. It is generally used where s is mute in words, adopted from sanskrit, as நாஸ்திகன் Nástikan, an infidel.

ह	హ	ಹ	ഹ	ஹ	ه ح ھ	h	The character ஹ is not found in the Tamil alphabet proper, but the use of it is on the increase, and I believe it is admitted by all that it is highly desirable to introduce it freely to express h in words adopted from the Sanskrit, as அஹங்காரம் ahankaram, egotism not அகங்...... akam ......
य	య	ಯ	യ	ய	ي ی ئ	y	
र	ర	ರ	ര	ர	ر ر	r	
ल	ల	ಲ	ല	ல	ل ا ا	l	
व	వ	ವ	വ	வ	و و	v w	
क्ष	క్ష	ಕ್ಷ	ക്ഷ	க்ஷ	—	ksh	
	ః	ಃ	ഃ	—	—	h	The Sanskrit visargah. Simply a soft final h.
	ం	ಂ	ം	—	—	m or n	The Sanskrit Anuswara. Simply a final m in sanskrit; in Telugu, Karnata, and Malayalam n or m according to the consonant it precedes.
	ఁ	—	—	—	ں ن	ṅ	Like the n in the French sans, bon. Hind: Nún-i-ghunna.
ळ	ళ	ಳ	ള	ள	—	ḷ	A harsh ḷ something like rl.
	ఱ	ಱ	റ	ற	ڑ ڙ	ṛ	
	—	—	ഴ	ழ	—	ḻ	The sound might be more nearly imitated by zh if the Tamil alphabet alone had to be represented. But it is impossible to imitate the sound exactly ; and zh has been chosen for the Hindustani ژ

Sanskrit. (Devanágari)	Telugu.	Karnáta.	Malayálam.	Tamil.	Persian and Hindústáni.	Proposed Roman Equivalent.	Remarks and Explanation.
	—	—	—	ஃ	—	<u>ch</u>	Called "aitham;" sounded like ch in German "nicht;" of very rare occurrence.
	—	—	—	—	ف ﻔ ﻓ	f	} as فَرق fark̤ difference.
	—	—	—	—	ق ﻘ ﻗ	k̤	
					ح ﺤ ﺣ	h	as in مسَاحَت masàḥat, measurement.
					خ ﺨ ﺧ	<u>kh</u>	as in خَير <u>kh</u>air, well!
					ث ﺜ ﺛ	s̤	as in ثَابِت s̤àbit, firm.
					ص ﺼ ﺻ	ṣ	as in صَدر ṣadr, principal.
					ط ﻃ	t̤	as in خُطُوط <u>kh</u>uṭùṭ, letters.
					ز ز	z]	as in زِندگي zindagi, property.
						'	

					ع ﻌ ﻋ	a comma	as in متعاد mút'ád accustomed.
					غ ﻐ ﻏ	g̲h̲	as in غير ghair without.
					ژ ژ	zh	as in ژاژ zházh, abuse.
					ض ﻀ ﺿ	ẓ	as in ضرور ẓurúr, necessary.
					ظ ظ	z̤	as in ظن z̤ann, suspicion.
					ذ ذ	z̲	as in ذو z̲ú, master.
					Hamza ء	—	as pa-e پائے "a foot," لاؤ la-o "bring."
					Hamza Mulaiyina	—i	as sa-ir سائر moveable, that which moves
					Tanwín ً	n̄	as تخمينًا tak̲h̲mínan̄, "conjecturally.";
					Waṣl وصل		This mark, when placed over the first letter of a word to which the Arabic article ال al is prefixed, changes the l of the article to the initial letter of the word following when that initial is t ṣ d z̲ r zh s sh s̤ ẓ z̤ l or n; as Mihr un-nis̤á sun of women; az̤har min ush shams, clearer than the sun.

Sanskrit. (Devanagari)	Telugu.	Karnata.	Malayalam.	Tamil.	Persian and Hindustani.	Proposed Roman Equivalent.	Remarks and Explanation.
Sounds peculiar to certain combinations of letters							
				ச்ச		tch	as ஈச்சமரம் ítchu-maram, the date tree.
			ററ	ற்ற		tt	as ചെറുമക്കൾ chettumakkal sons of the soil. slaves; pettu பெற்று having brought forth.
					ي ى	a	as in Fatwa فتوي (Alif-i-maksúra)
Sounds peculiar to certain single letters.							
	జ					dz	as రాజు radzu a king.
	చ					ts	as చూడు tsúdú. Behold!
					Wáo i M'adúla و و	w	As خير خواه khair khwah. This wáo is scarcely sounded at all ordinarily, or has the sound of a short u.

II. *On the substitution of the Roman for the Indian characters.* By Dr. Caldwell.

(*Communicated by Sir* C. E. Trevelyan.)

[This paper has been contributed by the Revd. Dr. Caldwell, the author of the "Comparative Grammar of the Dravidian or Southern Indian Family of Languages" which is decidedly the best book on ethnology and philology which has been published for many a long year. The paper also derives a peculiar interest from the fact, that the important subject of it—the application of the Roman letters to the languages of Southern India, has been thought out by the able and learned Doctor, without his having had access to the publications on the application of the same letters to the languages of Northern India. The book just published by Professor Monier Williams, and a pamphlet which may shortly be expected from the Revd. G. U. Pope, will supply ample information to everybody who is interested in the subject.]—C. E. T.

Sir,

The time appears to have arrived for the discussion in Southern India of a question which has made much progress in the North-West, the expediency of substituting the Roman character for the various characters now in use in India.

On this side of India, so far as I am aware, the plan has rarely, if ever, been seriously discussed. It has generally been regarded as a quixotical crotchet which may most fitly be met with a smile. What is chiefly required, therefore, as it appears to me, in this Presidency, is that the subject should be duly ventilated, and that educationists, missionaries, and public functionaries should be induced to bestow upon it a little serious attention.

Professor Max Müller has advocated the plan in his "Proposals for a Missionary Alphabet." Professor Monier Williams has also thrown his weight into the same scale, and has recently, I perceive, brought out a reprint of the principal documents that have been published for and against the scheme, since it was first mooted in Calcutta in 1834, I believe, by yourself. I am sorry that I

have not met with any of these publications; my ignorance of them, however, enables me to treat the subject independently, from a purely Indian point of view, and with special reference to the objections of persons who are practically conversant with the Indian languages.

The first thing to be done, on entering upon the consideration of this subject, is to satisfy ourselves whether the substitution of the Roman characters for the Indian, supposing it to be possible, would not be in the highest degree desirable and expedient.

I. In endeavouring to make this point quite clear at the outset, the consideration which first claims our attention is the intrinsic superiority of the Roman character to all others.

a. It is the simplest character in existence. Its 26 symbols are found to be sufficient for expressing all the consonantal and vowel sounds in the English language, and the addition of a very small number of accents has enabled it to meet the wants of the French, the German, and the Hungarian, the most widely differing systems of sounds in Europe.

b. It is the distinctest, most legible character in existence. No amount of practice will ever enable any one to read a florid charac-racter like the Persian, or complicated characters like the Déva-Nágarí, the Telugu, and the Singhalese, with the precision and rapidity with which the unadorned Roman character is read by the most ordinary readers.

So legible is it, that the practised eye can take in an entire page of a well printed European book at a glance, so as to have a general idea of the contents; whereas every Arab or Hindú, how well soever he may be acquanted with his own language and with its character, must confess that he cannot take in at a glance more than a few words of any book or MS. at a time, nor be sure of the meaning of a sentence unless he has read every word in it right through.

The Oriental regards as an impossibility the Englishman's ordinary daily achievement of ascertaining the news by merely looking over his newspaper, and gaining a correct general idea of the contents of a book by merely turning over the pages.

The wonderful legibleness of the Roman character, in compari-

son with all others, arises partly from its employment of a few independent, unchangeable characters for the expression of the vowel sounds, instead of a variety of minute signs and points; partly from its preference for straight lines, angles, and unadorned circles and arcs to the flowing tracery and complicated diagrams of oriental alphabets; partly from the circumstance that its letters are of different heights, half of them being on a level with the line and the other half rising a little above it or sinking a little below it, so as to facilitate identification; and partly also from its retention of an older form of the characters for use as capitals.

c. The Roman character is the compactest in existence. In no other character can so large a quantity of matter be compressed into so small a compass, without crowding the page or confusing the eye. It is, therefore, of all characters the cheapest for printing

d. It is politically and geographically the most suitable for universal use, and the only character which has the smallest chance of obtaining this distinction. It would be absurd to propose that the Malayâlam character should supersede the Gujaráthí, or the Tamil the Bengálí. It would be almost equally unreasonable to propose the substitution of any one character of a class for another of the same class, as the Tamil for the Telugu, or the Bengálí for the Gujaráthí. None of these characters has any claim to be used beyond the limits of the language to which it belongs.

The only characters known in India which possess any such claim are the Hindústání, the Déva-Nágarí, and the Roman.

Of these, the Hindústaní (the Persian slightly modified) is one of the least legible characters in existence, and its sole recommendation, the political supremacy of the Mahommedans, has ceased to exist.

The Déva-Nágarí, the most perfect of the Indian characters, is perhaps also the most legible, though very much less legible than the Roman. Probably also, next to Hindústaní, it is the most widely known. It is little known, however, and less used, in Southern India, even by Bráhmins. In the Telugu, Canarese, and Malayâlam countries Sanscrit is written in the characters peculiar to those languages, not in Déva-nágarí. In the Tamil country it is

written in a character called Grantham, a character from which the ordinary Tamil character is an off shoot. It is an error, though a popular error, and one which was recently repeated in the *Friend of India*, that the Déva-nágarí is the parent of all the Indian characters now in use. The various characters that are used in Southern India and Ceylon have only a distant family relation to the Déva-nágarí; being derived, by the process of incessant change, from the characters (preserved in king Asóká's inscriptions) which were in use in ancient India three centuries before the Christian era, and out of which the Déva-nágarí was developed in the North, and the Telugu, the Grantham (or Tamil), the Singhalese, &c. in the South. It is clear, therefore, that the Déva-nágarí cannot make out a claim to be more generally used than it is at present.

On the other hand, the Roman character, though introduced by foreigners, is already more widely known, if it is not used by a larger number of persons, than any other character in India. It is known where the Tamil has never been heard of, and where the Déva-Nágarí has never penetrated. It is used in the administration of justice and in all Government proceedings in every corner of British India, together with Ceylon and Pegu, and in the capitals, at least, of all Protected States. In addition to its great intrinsic merits, it has the advantage of being used by those nations that stand at the head of the world's civilisation. It is the only vehicle in the present age of a liberal education, and the extent to which it is used in any district in India is a measure of the degree in which society has made progress in that district. It is evident, therefore, that as soon as it becomes a practical question whether some one character might not be advantageously substituted for the many that are now in use, it must be admitted that the only character which possesses any claim to this distinction is the Roman.

e. It may be added, though it is only a matter of archaiological interest, that the Roman character is the best existing representative of that primitive written character which was used in the West by the ancient Phenicians and Greeks, and in the East by the Buddhists of Behar, and which was probably

the origin of all the alphabetical characters that are now known in the world.

About a year and a half ago I had a conversation with Mr. Hunt, of the American Mission Press in Madras, respecting the introduction of the use of capitals into Tamil printing, and showed him a few of the more ancient forms of the Tamil characters; which seemed to me to be suitable for the purpose in view, inasmuch as they bore the same relation to the Tamil character now in use of greater antiquity and greater simplicity which is borne by the Roman capitals to the smaller type of our books. I endeavoured afterwards to make out in this manner a complete set of suitable capitals; but the further I went the more I felt convinced of the accuracy of the hypothesis (first started by Kopp in 1821) of the Semitic origin of the Indian characters. It appeared to me to be certain, not only that all Indian characters had one and the same origin, but that the oldest form of the Indian characters was nearly identical with the Phenician, which was the origin of, and substantially identical with, the old Roman. (See Weber's Lecture on this subject in his Indische Skizzen, 1857.) If so, I began to think, why stop short half way, by seeking only the advantage of the Tamil people, when by going a little further a great additional advantage to the whole empire might be secured? If we have to go back a thousand years in search of Tamil capitals, which, when they are discovered, are found to differ almost as much from the modern Tamil characters as the Roman do, why not at once go back a thousand years more, and re-introduce the oldest characters of all (or at least, their most faithful existing representatives), and which are by far the best fitted of all for universal use, the Roman characters themselves?

II. The next point which deserves attention is the number and importance of the advantages that might be expected to flow from the use of the Roman character.

Some of those advantages would be realised by Europeans at the very outset, as soon as a few books came to be published in this character, whilst others would remain in abeyance till it came to be generally used by the Natives themselves.

a. The use of the Roman character would facilitate the study of the Native languages by Europeans. It would, of course, be

as necessary as ever for Europeans to learn the sounds of the various vernaculars, and this could only be done by listening to and imitating the pronunciation of Natives, but the trouble, perplexity, and delay arising from the assumed necessity of learning intricate native characters would be at an end.

It is true that a man who is thoroughly determined to learn a language will not allow himself to be baffled by any written character, however difficult. An enthusiast will get over the difficulties of the Chinese symbols themselves. But all men are not enthusiasts. It is desirable that all Europeans resident in India—merchants and soldiers, as well as missionaries and civilians, ladies as well as gentlemen—should learn one at least of the vernaculars; but the necessity of overcoming at the outset so considerable a difficulty deters the majority of non-official persons from even making the attempt. Most East Indians also, though they can talk the native languages fluently, are deterred by the difficulty of the character from learning to read, and in consequence, they exert much less influence in the country than they might otherwise do.

The necessity of using the Indian characters is found, however, to retard the progress of even the earnest student. We are constantly told that the native characters may be got up in a few days, and that after that all difficulty is at an end. But is this really so? Why is it then that so few Europeans can read any book or MS. in any of the native languages fluently? Why is it that you might almost count on your little finger the number of Europeans in the Madras Presidency who can *write* with any degree of rapidity in the native characters? The explanation is, that the Indian characters are so complicated and the modes in which the vowels are denoted and affixed to the consonants are so numerous and intricate, that fluent reading and ready writing are really very difficult attainments. I never met with an European who could read any vernacular book fluently at sight (leaving the meaning of what was read out of account) under a couple of years' constant labour and study, and there are some who never acquire this facility at all, but are always obliged to spell their way through a book in private before they can venture to read it in public.

There is also an ulterior disadvantage. Even those who are most fully resolved to learn the vernacular of their district thoroughly, and who complain least of the difficulty of the character, are often deterred by similar difficulties from learning any additional vernacular. Each of the principal languages of India unfortunately possesses a character of its own, and hence, notwithstanding the closeness of the relation subsisting between the Bengálí, the Hindí, the Gujaráthí, and the Maráthí, the principal languages of the Sanscritic family, and in like manner between the Tamil, the Telugu, the Canarese, and the Malayálam, the principal languages of the Drávidian family—a relationship which is so close that one might easily learn the differences between the various languages of the same family, in grammar and use of words, without the aid of a teacher, if one character only were used instead of many, yet the fact is that few Europeans, besides those who are required by the rules of the public service, acquire any acquaintance with more than one of the vernacular tongues. If every Tamil scholar were enabled to read books in the cognate languages, without the trouble of learning a new character, few persons would neglect so easy and interesting a study, and the consequence would be, not only that Tamil scholarship would be much riper, I believe, than it is, but also that every one who wished to make himself useful in his generation would be enabled without difficulty to double or treble his capacity for usefulness.

b. The use of the Roman character would facilitate native education. I have just said that foreigners, though they may be well acquainted with the Indian vernaculars, are rarely able to read them fluently, but the same deficiency may generally be noticed amongst the Natives themselves. Natives who are employed in the public service, are enabled, by dint of constant practice, to read with much facility, but the great majority of the people, including the majority even of the schoolmasters, read with much hesitation and difficulty. In the rural districts, a fluent reader is almost as rare as a profound scholar. The accuracy of this statement will be admitted by every missionary who has been brought into contact with the masses, and who has tested the ability to read of those who have asked him for tracts and books. The hesitancy with which

most Natives read is generally attributed to the inferior quality of the education they receive. Doubtless the education communicated in the old, unimproved vernacular schools is defective enough, but considering the length of time the children generally stay in school, they ought at least to master the mechanical art of reading It is a Native proberb that " arithmetic and writing (literally letters, that is, reading and writing) are the two eyes of man." Native arithmetic is undoubtedly well learnt in Native schools, and as the Natives are equally desirous of learning to read fluently, the exceeding rareness of this accomplishment must be owing to the difficulty of their character. Every one who has attentively listened to Native reading and noticed the *class* of mistakes that most frequently occur, will be able to confirm the accuracy of this opinion.

I have had considerable experience myself for many years in the superintendence of vernacular village schools, in the daily instruction of pupils in mission boarding schools, and in the training of schoolmasters and catechists, and so far as my own experience has gone, the ability to read any printed book fluently at sight, without mistakes, has always appeared to me to be one of the rarest of Native acquirements. However clear the style of the book may be, and however familiar the subject, I have found that almost all Natives will commit blunders in reading which similarly taught English people would never commit in reading English.

The perplexity of the Native characters presses still more heavily upon children than upon adults. In examining from month to month the progress made by Native children in learning their letters, the difficulty of the native character has often forced itself upon my attention. To learn any Indian alphabet thoroughly, so as to be able to combine every consonant with every vowel and to know the various combinations of consonants, involves an acquaintance with from 200 to 500 symbols, according to the nature of the alphabet, and is surely the most difficult task to which poor school children are set in any country in the world. So difficult is it, that ere the duller sort of children have learnt their letters, the time is come when they should leave school. At least five per cent. of the pupils in Native schools, not including idiotic children

or truants, fail to get through even the alphabet, which is the *pons asinorum* of Hindú education. Every one has pitied the fate of unfortunate Native children, who are compelled to toil every day from 6 o'clock in the morning at so wearisome a task, but almost every one has fancied that it was impossible to let them off more easily. I believe that the case was not so hopeless as was supposed. Possibly some Europeans, though they admit that the Indian characters are difficult, are not prepared to admit that they are a practical obstacle to education; or at least, they will not make this admission with respect to the character which they have themselves learnt. A person who has succeeded in learning to read Telugu with ease, will not admit that the Telugu character is an obstacle to knowledge, but he is ready enough to cry out about the perplexities of the Tamil or the Malayálam. Vice versâ, one who has overcome the difficulties of the Tamil character professes to find his fetters on the whole a convenience to him rather than otherwise, but he has no mercy on the Telugu, which "goes out of its way," he will say, "to invent difficulties." Every character in India will find apologists in turn. "It is true they are difficult," it will be said, "but the difficulty is unavoidable and is soon got over." People are unwilling that what occupied so much of their own time should be considered as valueless or worse, and wish to impose the same task upon their successors. Perhaps, therefore, the best way to form a fair, impartial estimate of the difficulty of the Native characters, and to judge whether or not they are an obstacle to education, will be to call attention to a character which is unknown on the Continent of India, though as truly Indian in a general sense as any other—I mean the Singhalese.

This character on the whole resembles the Telugu more than any other now used in India, though the mode in which it combines its vowels with its consonants has most resemblance to the Grantham. It is unnecessary to write or print the letters and vowel symbols referred to in the following extract from Lambrick's Singhalese Grammar: the English explanation of their use and meaning will be sufficiently intelligible (?) of itself. Note, that what follows is to be learnt by Native children, as well as by adult foreigners.

SYMBOLS.

Aelapilla,	Combua.	Raibha.
Ispilla, 1st and 2nd	Aeda.	Matransi.
Papilla, do. do.	Gahenukitta.	Yangsi.
Al, do. do.	Bindu.	Sanyaga.

Ispilla, Al, and Raibha are written above their letters ; Papilla Aeda, and Matransi are written below their letters.

The others are written on the same line ;—Combua and Sanyaga before their letters ; Aelapilla, Gahenukitta, Bindu, and Yangsi, after their letters.

The first Ispilla is joined to letters that have a tail turned back, the second Ispilla is used with all other letters.

The first Papilla is joined to *k*, &c., the second Papilla is joined with all other letters.

The first Al is joined with all letters that have a tail turned back, the second Al is written with all other letters.

Use of the Symbols.

A is made long by aelapilla, *u* by gahenukitta; the other three by al. The peculiar vowel is written by adding aeda to *a*.

Aelapilla is the symbol for *a*.
Ispilla is the symbol for *i*, ispilla gaeta for *ì*.
Papilla is the symbol for *u*, papilla paekanea for *ù*.
Combua is the symbol for *e*, combua with al for *é*.

Combua with aelapilla is the symbol for *o*, al added to the aelapilla makes *ò*.

Combua with gahenukitta is the symbal for *au*.
Combua doubled is the symbol for *ei*.

Aeda is the symbol for the peculiar vowel sound ; aeda paekanea makes this vowel long.

Al has two uses : first it lengthens a vowel, secondly when joined to a consonant that has no symbol it suppresses the inherent vowel. (!)

Bindu is properly a substitute for *ò* ; but in common writing it is substituted for all the vowels with al. (!)

Bindu doubled is a symbol for *kh*. (!)

Raibha is the symbol for *r* preceding another consonant.

Matransi is the symbol for *r* following another consonant.

Yangsi is the symbol for *y* following another consonant.

Sanyaga has two powers : first, before the rough linguals it is the sign of the corresponding smooth lingual, also before *w* it stands for *d*. Second, before all other consonants it stands for *a* nasal pronounced slightly. (!)

On studying the above scheme of symbols, with the conflicting rules respecting their position and their double or treble conflicting significations, the apologists of the Déva-nágarí, Telugu, Tamil, and other characters, have an excellent opportunity of forming an unbiassed judgment respecting the merits of the Indian system of writing. If they have not already learnt Singhalese, I have no doubt that they are unanimously of opinion, that it would be unwise to give their sanction to the use of such a character, or to do any thing that would ensure its perpetuation, seeing that it is so evident that it must be an obstacle to education. They will admit at once that it would be a mercy to poor Singhalese children to set them free, if it were possible, from the necessity of getting up these minute, intricate, perplexing rules. "Bradshaw" itself would be a pleasant easy study for children of five years of age in comparison with this alphabetical puzzle ! One would almost imagine that it had been the wish of the Singhalese schoolmasters to invent a system of writing which should enable them to keep all the knowledge in the island in their own hands for ever. In forming this judgment of the Singhalese, however, the Indian systems will be found to come under the same condemnation ; for, after all, on a careful comparison of each of the Singhalese symbols with its counterpart in Tamil and Telugu, I have not been able to see any essential difference between the system of Ceylon and the systems of Southern India. For example, it is a rule of the Tamil, as well as of the Singhalese, mode of writing, that the symbols which represent the vowels *e* and *ei*, in combination with the consonants, *precede* the consonants to which they belong, though they are pronounced *after* them. Thus "veda" is written in Tamil "*evda*," though it is pronounced *veda*, and "Veigei,"

the name of the Madura river, is written " Eiveig !" So also, it is a rule of the Tamil, as of the Singhalese, that the vowel *o*, in combination with a consonant, is denoted by the symbols proper to *e* and to long *a*, and that the *e* precedes the consonant and the *a* follows it, though the *o* which they unite to denote is pronounced after it. Thus Kóttei, " a fort," is written " Ekateit !" Surely nothing in Singhalese can be more perplexing than this. I have got accustomed to write " Kóttei" in this extraordinary fashion in Tamil, and feel no difficulty in it now, but I made several mistakes before I succeeded in transliterating the Tamil spelling correctly into English as above. I feel sure that every foreigner learning Tamil, and every Tamil child, would be thankful to be freed from the necessity of writing Ekateit for Kóttei.

Even the Déva-nàgarí is chargeable with this strange anomaly, for though it denotes *o* in a more rational manner, it requires us to write short *i* before the consonants which it ought to follow. Thus " tri," three, is written " itr !"

It is evident, therefore, that if the Singhalese system seems to persons who are conversant only with the Indian systems more perplexing than the Indian ones, it is only because they are less accustomed to it, and in a better condition for forming an impartial estimate of its defects.

It may be concluded, then, that the substitution of the Roman characters for the Indian, supposing it to be possible, would greatly facilitate Native education. It would render it easier for Native children to learn to read, and would thus increase the number of readers and facilitate the diffusion of knowledge, whilst it would also bring the accomplishment of good fluent reading within general reach.

c. The use of the Roman character throughout India would enable each people to participate in the intellectual advantages enjoyed by its neighbours. What a calamity would it have been for Europe and the world, if each European nation on emerging from barbarism had adopted a written character of its own ! Each separate character would have formed a wall of separation, by means of which the various nations would have been kept in ignorance of one another and precluded from competing with, and stimulating,

one another in the race of civilisation. The calamity which Europe escaped has unfortunately fallen upon India, the various populations of which, though civilised from a common source, are sundered and isolated not only by differences of language and caste, but by the use of different characters. So long as the country was parcelled out into a multitude of independent political divisions, this evil could not be remedied, but now that a single Government has acquired a position of commanding influence in every part of India, there seems to be no reason why the different nations might not be united together by the use of a single alphabet. If this were done, the various languages belonging to each of the great families being very similar in structure and pronunciation, books and newspapers published in any one language would become more widely diffused in other language districts, and more extensively useful, than at present. Whatever works of genius or results of progress distinguished any one people would speedily become the common property of the race, and the empire would learn to feel itself to be one. The Roman character being in general use, the study of the English language would necessarily be popularised, and it might reasonably be expected—it might, at least, reasonably be hoped—that the gulph which now separates the Eastern mind from the Western would by degrees be bridged across. The adoption by the East of the literary symbols of the West would be at least a step towards union, and a sign of the deeper union which is desired.

d. If the Roman character were in general use books might be printed at a greatly reduced cost. This advantage would necessarily appear last in the order of time; it would not take effect till the change became universal or at least very general; but it must be admitted to be an advantage of great national importance.

The various Indian characters occupy much more space than the Roman, and their twirls and ornaments, together with the clumsy mode of combining consonants which prevails in many of them, viz., tying them up one within the other in a bundle, instead of placing them one after the other in the order of their pronunciation, render it necessary that the lines should be kept far apart. Some of the Indian characters have been a good deal compressed already by the

ingenuity of foreign printers, but they cannot be compressed any further without seriously endangering legibility.

Supposing the Roman characters to have come into general use, every variety of English type, down to the smallest, would be immediately available for printing vernacular books; and cheapness and legibility, instead of being antagonistic qualities, as at present, would go hand in hand.

One advantage of the change would be that printers would be able to introduce all English improvements, to give their books a more inviting appearance, and to suit the taste of the public, or rather, to create a taste, by the use of a greater variety of styles than is practicable at present. Another advantage, and a still more important one in a populous, poor country like India, would be that it would cheapen printing to an enormous extent. The difference in size and price between English books and books printed in the vernaculars is chiefly owing to the difference of type. The best means of forming an accurate comparative estimate will be to take some book which has been translated as closely as possible from English into one of the vernacular tongues, and to compare its price in the two languages. Compare, for instance, the English Bible with the Tamil Bible. I recently received a grant from the Madras Auxiliary Bible Society of several hundreds of copies of their "Jubilee edition" of the Tamil Bible. This Bible is one of the clearest, neatest, compactest, cheapest specimens of Tamil typography which I have yet seen, and we are indebted for it, as for almost all improvements in Tamil printing, to Mr. Hunt of the American Mission Press. This Bible, which is one of Mr. Hunt's triumphs, is of the size of an English "Family Bible," weighs five pounds, and its price to non-subscribers, which is, I presume under, rather than over, its cost price is Rs. 4-12 or Sh. 9-6. At the same time, and from the same Society, I received a grant of some copies of the English Bible, so that I was naturally led to draw a comparison between them. The edition of the English Bible which was sent to me was published for distribution amongst the labouring classes in England, and seems to me to be printed in a sufficiently clear type, and to be neatly enough got up, for general use in schools in this country. It is too large to be called a "pocket Bible," and would be just the size for general use among Hindú

christians, who are not accustomed to wear pockets. It weighs one pound, a fifth of the weight of its Tamil translation, and its title, "the ten-penny Bible," tells its own tale respecting the difference in price.

The size and costliness of all vernacular books form an incalculable hindrance to their circulation and general use, and place the purchase of them beyond the reach of the majority of Hindú readers. The necessaries of life being six times as cheap in India as in England, and skilled labour (such as is procurable) being cheap in proportion, books also ought to be six times as cheap; whereas, instead of being six times cheaper, they are at least ten times as dear. The necessity of using certain English materials may partly account for this, but the greater part of the extra expense must be placed to the account of the Indian characters. If this expensive character could be got rid of, the greater cheapness and portableness of printed books would stimulate the literary appetite of the people, facilitate all efforts to enlighten and elevate them, and probably lead to results of immense importance in the hidden future.

I do not contend that the substitution of the Roman characters for the Indian would, all at once, and in all cases, make vernacular works as cheap as English ones. In printing works in the Drávidian languages, in which many of the words consist of long strings of particles agglutinated together, more types would have to be set up, more space would be occupied, and more paper would be required, than if the same quantity of thought had to be printed in English. The difference, as respects books translated from English, would amount to an addition of nearly three-fourths more matter; that is, a page of English turned into Tamil, even if the Roman characters were used, would occupy about a page and three-quarters. Original Tamil compositions, however, would not, or at least need not, occupy more space than English, for the lengthiness of the Tamil words has taught all writers who wish to be regarded as classical to cultivate a highly condensed style. Even supposing, however, that Tamil works printed in the Roman character were to cost twice as much as English and to reach twice the size, which is considerably beyond a fair estimate, the gain to Indian purses and the stimulus to Indian minds, would still be very great.

It is admitted that this particular result, the cheapening of vernacular literature, would not take effect till the Roman characters came into very general use, and as the force of custom in this old conservative country is prodigiously great, the most sanguine reformer will have to make up his mind to wait a considerable time. My argument, however, will not be weakened by the probability of delay. I only ask it to be supposed, that somehow, at some period or another, the change has been effected, and I argue that the consequence of the change would be, that books would become cheaper, that readers would become more numerous, and that the native mind would receive a stimulus of incalculable force. Is not this deduction a valid one? If it is a valid deduction, then however difficult the change may be, and however long the difficulty may continue to be felt, it is evident that it is one of those difficult achievements which are worth working for.

Most persons who are opposed to the change here advocated are ready to admit its desirableness in the abstract. Their position is, that it is surrounded with difficulties, and, in short, that it is impracticable. If so, it might be thought that I need not have troubled myself to prove the superiority of the Roman character and the advantages that would flow from its adoption, but should have confined myself to proving the practicability of the scheme. It seemed desirable, however, to show the exceeding strength of the argument from expediency before proceeding farther. Let it be admitted, as I think it will be, that the change would be in the highest degree desirable and expedient, if only it were practicable, and it must then also be admitted, that nothing short of the clearest proof of its impossibility should deter us from making the attempt.

III. I proceed to consider various objections to the plan which have been mentioned to me, and which have been supposed to prove it to be impracticable, reserving to the last the strongest objection of all (I think I may style it the only objection of any real strength), the alleged inadequacy of the Roman character to express the sounds of the Indian languages.

a. It is objected that, even if the change be not impracticable in itself, it is impracticable now. It might perhaps have been possible, it is said, to express all the languages of India in the Roman cha-

racter, if other characters had not already pre-occupied the ground. We have to deal with a people, it is said, who have had a literature of their own and characters of their own for thousands of years, and what instance is there on record of such a people having been induced to change their written characters? Besides, ever since the arrival of the English in India we have been using those characters ourselves, printing books in them, and doing what we could to ensure their perpetuation. I do not underrate this difficulty; we have doubtless allowed the best time for making such a change to pass by; but if the advantages of the plan are so great as they have been shown to be, and if there is no inherent impracticability, we ought even now to make the attempt. "Better late than never."

As regards the use of the Indian characters by Europeans, the difficulty arising from *their* attachment to custom cannot be supposed to render the change impossible. Even if all the Europeans now in India who have learnt the Native characters should decline to abandon as useless an acquirement which cost them so much trouble, every new arrival would be delighted to find his difficulties diminished. A generation of the English in India arrives and disappears, sad to say, in so short a period, that supposing only that all newly arrived Europeans were willing to adopt the change, it would come into almost universal use amongst the governing race in ten years.

Then also, as regards the Natives, though the change, on the most sanguine calculation, would take a considerable time—possibly it might never become absolutely universal—yet there are certain classes of Natives amongst whom it might make its way as rapidly as amongst newly arrived Europeans. I refer to the Native youth in government and missionary schools, and schools which are supported by Natives but conducted by Europeans. As those who are boys now will be the men of the next generation, and as the most influential Natives are those who have received their education in such schools, it is evident that it is only for Europeans to will it, and the only Natives of the next generation who are likely to possess any influence will have adopted the change. It was only last week that I saw in the papers that the

use of the Roman character had been introduced into all public schools in the Benares district. Let the same course be adopted elsewhere, and final success is sure.

A considerable proportion of the difficulty which exists, and which is alleged as a reason for regarding the change as impracticable now, is a difficulty which is being created by ourselves, and which we can put an end to whenever we think fit. Year by year we are labouring for the extension of education, and undoubtedly education is extending; but seeing that the whole of the vernacular instruction that we communicate to native youth, at least in this part of India, is still conveyed to them through the medium of the Native characters, by perpetuating those characters, we are perpetuating obstacles to education.

In some parts of India we are going further even than this, for we are introducing the Native characters where they were previously unknown. We are endeavouring to civilise and educate wild hill tribes who never had any written character before, and where languages are widely different from those that are spoken in the adjacent plains, and yet, instead of taking the opportunity of teaching them our own simple characters from the outset, we are puzzling their brains and giving them a distaste for education, by setting them to learn the complicated characters invented by their subtle Hindú neighbours. Thus, we are teaching the Bengálí character to the Sántáls of the Rajmahal range, who speak a Kôl language, and the Malar, or "hill people," of the same range, who speak a Dravidian language. We are teaching the Uriya character to the Khonds of Goomsoor, and the Nágarí to the Gonds of the Nerbudda, both Dravidian tribes; and the aborigines of the Nilgherries, peculiar Dravidian tribes, are being taught the Tamil and Canarese characters. In these instances we appear to be going out of our way to invent difficulties which must afterwards be removed.

Perhaps the best argument in proof of the practicability, even now, at this late period of Indian history, of substituting one set of characters for many, is the fact of a similar substitution having already been made. *The numeral characters of Europe have recently been substituted for the numeral characters of India, and are now rapidly winning their way to universal use.* I am aware that strictly

speaking those characters are not European : we borrowed them from the Arabs, and the Arabs from the Hindús ; but so many changes have been made in their shape during the lapse of ages, on the one hand by Europeans and on the other by the Hindús themselves, that there is now not much more resemblance between the Indian ciphers, as used by Hindús, and their European equivalents, than there is between the alphabetical characters of India and those of Europe. In the Tamil country, the ancient shapes of the ciphers were more completely lost than elsewhere, and even decimal notation, though a Hindú invention, had been completely forgotten. In consequence of this, the old Indian numeral ciphers that were re-introduced from Europe were universally called "the English numerals," and the old Indian system of notation was called "the English mode of arithmetic." In this instance, as truly as in that of the alphabetical characters of India, the ground had been pre-occupied for ages ; but notwithstanding this, Government came to the conclusion that it was expedient that the English cipher and the English modes of calculation should alone be used in all public accounts. It had been the custom that the public accounts should be made out first in the vernacular of the district, then translated into Maráthí for the benefit of the Sheristadars, (who were always Maratha Brahmans, because none but Maratha Brahmans could understand the Maratha accounts,) and then finally translated into English for the information of Government. But no sooner did Government determine that this round-about system should cease, and that the English cipher and English modes of calculation should be used from first to last, than the change was successfully accomplished. The substitution was carried into effect at a word, and now all Government officials, down to the Curnums of the villages, nor they only, but even the poorest peasant children in our schools (in this neighbourhood, at least, and I presume elsewhere,) are daily using "the English cipher."

It is true that at present every Native boy learns the Native numerals, as well as the English, but this double trouble will cease of itself in due time, when it is practically found to be un necessary.

Here, then, is an instance, in point, of a substitution of one character for many, such as is here advocated, having actually taken place: and if we have succeeded in introducing our ten numeral characters into general use, is it quite clearly an impracticable task, even at this late period, to aim at obtaining similar currency for our 26 alphabetical characters? It may fairly be argued that it will take a considerably longer time, but surely we should cease to be told that the thing is impracticable.

b. It is objected, that if the Roman character were introduced, there would be many different systems of applying it to the Indian languages, the result of which would be confusion worse confounded. It would be necessary to make use of accents and diacritical points for the purpose of distinguishing long vowels from short ones, and denoting certain peculiar Indian consonants. Every person, it is said, would have a diacritical system of his own, and in the end it would be found, that documents could be deciphered only by the person who wrote them.

I admit the existence of this danger, though not its alleged amount; but a danger which, when foreseen, may be guarded against by a little consideration, is a very different thing from an insuperable obstacle. It is often necessary even at present to represent Indian words by means of English characters. Passages from the poets, dicta from the law books, peculiar Native expressions on which some dispute hinges, require sometimes to be transliterated, and not merely translated. It is still more frequently necessary to write in Roman characters the names of persons, places, books, &c., together with revenue and administrative terms. As the propriety of adhering to a system is not at present practically felt, and as some of the details of the Roman system are still unsettled, persons who find it necessary to transliterate Indian words are generally accustomed to do so according to their own taste and fancy. Thus, in the last Report of the Madras Bible Society one writer calls the sacred books of the Hindùs *Vedas*, another *Vathems*. In a catalogue of books sold at the Government Book Depots which has just been published, the Sanscrit word for "morals" is written in one place *neethi*, in another *niti*. But the most extraordinary specimens of optional spelling which I have

yet met with are to be found in the large government maps of India. In that part of the map which includes the district of Tinnevelly, the Tamil word for "tank," a simple dissyllable, is written in thirteen different ways! Though there is much confusion at present, owing to the absence of an authorised system, it by no means follows that this confusion would continue after a system had been fully considered and definitively introduced, and people generally had become aware of the existence of the system.

Even at present, there is no difference of importance amongst Orientalists respecting the way in which Indian words should be written. As regards the letters by which the Indian vowels should be represented, which is the most important point of all, English, German, and French Orientalists are now perfectly agreed. The points respecting which differences of system still exist are of small moment and might easily be settled. Still I fully admit that they require consideration, for any attempt to introduce into general use a system which had not been thoroughly thought out and digested in all its details, would probably end in failure and throw the scheme back another 30 years.

I will refer hereafter to minor details, but I may here mention some general principles which will require to be considered. (1) A system which takes the Sanskrit alone into account and contents itself with meeting the wants of the Sanskrit, will not suit the purpose in view, which is to apply the Roman character to all the languages of India. The wants of the Hindústánì and of the Dravidian languages will also have to be provided for. For instance, Sanskrit is destitute of the short sounds of *e* and *o*. Consequently Sanskrit scholars, who distinguish the other long vowels by accents, leave these two long vowels without any distinguishing sign. This would, however, introduce confusion into the Dravidian languages, which have short forms of *e* and *o*, as well as long. It will be necessary, therefore, to deal with the Indian languages as a whole, in order that there may be but one system in use everywhere, and also to study separately the peculiar necessities of each of the Indian languages, in order that the peculiarities of each may be taken into account in the general arrangement. (2). Another difficulty which must be taken into consideration re-

lates to the use of accents and diacritical points in *cursive* writing. Such devices may succeed very well in printed books, but are they equally suitable for manuscripts? or can a system be invented which shall equally suit both purposes? The cursive character must run, or else it is not "cursive," but running will be precluded, if people are obliged to stop too frequently to add on accents and dots. There is some danger lest the only thing that is considered is what is suitable for printing. For this reason Prof. Monier Williams' plan (see his Sanskrit Grammar) of distinguishing the nasal of the guttural row (our English *ng*) by *n* with a dot *on one side of it*, appears to be inadmissible. (3.) The Germans seem to claim a national right to transliterate the Indian *y* by *j*, in consequence of which they are driven to represent the sound of *j* by *g*. In like manner, being accustomed to give a sound of their own to *ch*, they transliterate the Indian palatal *ch* by *k̤*. Seeing, however, that the English have a special interest in the matter, and that we are consulting not for ourselves only but for the Hindús, to whom English is the language of civilisation, we may at once, I think, determine to keep to our own usage in these points. We must yield up to the Germans and the rest of the world (indeed we have already yielded) our peculiar English mode of pronouncing the vowels; but the consonants stand on a different footing.

With respect to these and similar matters, down to the minutest points of detail, we must see that every thing is duly considered before a commencement is made. Uniformity of plan is a necessary condition of success, and *this uniformity can be secured by the action of Government alone.* Considering that there are so many different languages and characters in India, so many different races and communities, and so many presidencies and protected states, it appears to me that in this matter, as in the introduction of the English numerals, Government must take the initiative.

c. It has been objected that the Roman characters are greatly inferior to the Indian in precision, seeing that each Indian character represents only one sound, whereas each Roman character represents many. It is admitted in reply, that there is a considerable difference in European tongues, particularly in the English and the French, between the spelling of words and their pronunciation,

though it does not follow that this defect is owing to the character. Even if it were owing to this, however, the superiority of the Indian characters to the Roman would not thereby be established, for the Indian characters also are used with a considerable latitude of pronunciation. It is commonly said that each Indian character has only one sound, that when once that sound has been learnt it must invariably be adhered to, and that every word is pronounced precisely as it is written; but there is a good deal of exaggeration in all this eulogy. In Tamil, at least, every letter has as wide a margin of sound as in any European tongue.

The Tamil letter *t* has three sounds, and the proper place for each sound can be learnt only by practice. At the beginning of a word and when doubled, it is pronounced as *t*—more softly, however, than the English *t;* after a nasal it is pronounced as *d;* and in the middle of a word, when followed by a vowel, it takes the sound of the soft English *th* in "than." Only one character is employed, and yet the least violation of these rules grates unpleasantly on the Native ear. If the Roman *t* were substituted for the Tamil one, it does not appear to me that the difficulty which now exists would be in the least increased.

The same latitude of pronunciation characterises the greater number of the Tamil consonants. The vowels also have at least as many different shades of pronunciation as the English vowels. In pronouncing the vowel *a*, for instance there are four distinct modes of pronunciation, each of which characterises certain classes of words. In like manner, every Tamil vowel, long or short, might be shown to have two or three different pronunciations, which are in reality so many diphthongs. They are not distinguished however from one another by any difference of character, nor is any notice taken of them in Native grammars, though the intelligibleness of what is spoken depends in a great degree upon the accurate observance of these differences.

The objection which I am now discussing has really no validity at all, for whatever be the latitude with which particular letters are pronounced in the European languages, they will have that latitude only in the Indian languages which their Indian equivalents have already. In this respect the substitution of the one charac-

ter for the other will leave matters precisely as it found them. If the Indian *k*, *t* or *l*, or the Indian *a*, *i*, or *e*, happens to be pronounced in one way only, the Roman *k*, *t*, and *l*, and the Roman *a*, *i*, and *e* will in like manner have only one sound each. If the Indian characters represent, as they sometimes do, several different sounds, it will simply be necessary to pronounce the corresponding Roman characters in each of those different ways, as the usage of the language may require. No existing advantage, therefore, will in reality be forfeited, whilst, as was previously shown, many will be gained by the use of the Roman character.

I may here add that the danger to the acquisition of a correct pronunciation of the Native languages arising from the use of the Roman character seems to be equally unreal. It is quite true that the English characters will naturally in the first instance suggest to the beginner their corresponding English sounds, but this is a danger to which every person who commences to learn a new language by book is exposed. The Englishman learning to read French, the Frenchman learning to read German, the German learning to read Hungarian, is constantly liable to pronounce old familiar letters in the old familiar manner. It will always be necessary to learn pronunciation by the ear, not by the eye. But whilst I admit that learners may be tempted to pronounce the Roman characters not in the Indian but in the European manner, I ask are not the Indian characters themselves pronounced at first in the European manner by every learner? As soon as the learner discovers that such and such Indian characters are the equivalents of such and such European ones, he forthwith supposes that the sounds also must be identical. It is only after many errors that he learns that, whatever the literary symbols of a language may be, the sounds of the language are to be learnt exclusively from the speech of the people.

d. The last objection, and the most serious is, that there are sounds in the Indian languages for which the Roman character has no equivalent letters. This is undoubtedly a valid objection, so far as it goes, and there are many persons who would give in their adhesion to the scheme, if only they thought that this difficulty could be satisfactorily disposed of. Supposing it to be prac-

ticable, they are ready to admit all the advantages that have been attributed to it, and to abandon all the objections that have been hitherto mentioned as invalid; but they are persuaded of the inadequacy of the Roman character to the expression of the Indian sounds, and on this ground they reject it as impracticable.

Until lately I held this view myself, but, like most other people, I presume, without examination. A few years ago, however, I found it necessary, in preparing for the Press a Comparative Grammar of the Dravidian languages, to represent a great many words belonging to those languages and some Sanskrit ones in the Roman character, for the sake of facilitating comparison and keeping down expense. I had no intention of experimenting upon the adequacy of the Roman character for the purpose in view, and some of the details of the system which I pursued were not thoroughly satisfactory; but I did the best I could under the circumstances, and as I went on I was gratified to find that the use of the Roman character was much more feasible than I had supposed. I met with no difficulty that appeared to be insuperable, and such difficulties as I did meet with were wholly owing to the absence of an authorised system.

Let us see then whether the alleged impracticability of the scheme will hold its ground when carefully examined. I will endeavour to show, first, that the majority of the Indian sounds can be expressed by the Roman characters without any change whatever, and then, that the Roman character can be enabled to express the remainder by the help of a very small number of accents and points. In doing so, I will endeavour to help forward the definitive settlement of details, a point of great importance, by giving the particulars of the plan which now commends itself most to my own mind.

(1.) The number of letters in the Indian languages which cannot be transliterated, just as they stand, without the addition of any accents or points, is in reality very small, and the number of such letters is smaller in some languages than in others.

The following vowels and consonants of the Déva-Nágarí alphabet, and of the alphabets which follow the same arrangement, can

be represented by the Roman characters quite as easily as by the Indian.

I adhere to the order of the Déva-Nágarí.

Vowels.

Short Vowels, a, i, u, e, o.
Diphthongs, ai (or ei), au.

Consonants.

Gutturals, k, kh, g, gh.
Palatals, c, ch, j, jh.
Dentals, t, th, d, dh, n.
Labials, p, ph, b, bh, m.
Semi-vowels, y, r, l, v.
Sibilants,—sh, s.
Aspirate, h.

On examining the above list, it will be seen that I have transliterated one consonant, with its aspirate, somewhat differently from the usual mode. The first consonant of the palatal row is generally represented by *ch* and its aspirate by *chh*. I have preferred *c* and *ch*. This change seems desirable partly for the sake of the Sanskrit itself, in which *ch* is a purely palatal letter, without any admixture of an aspirate, and therefore unaptly transliterated by a compound letter with an *h* in it (besides which the aspirate *chh* is particularly awkward), but chiefly for the sake of the Tamil, which uses its own *ch* as the representative of all palatal and nearly all sibilant sounds. The Tamil borrows occasionally Grantham letters for expressing the strong sibilants *sh* and *s* when they occur in Sanskrit words, but it always uses its own *ch* for "the *ś* of Siva" (and sometimes for *s*), as well as for *ch*, *chh*, *j*, *jh*.

This Tamil letter, when single, has a sound midway between *ś* and *ch*, but when doubled has exactly the sound of the English and Deva-nagari *ch*. It is fortunate for the Deva-nagari *ch* that it is rarely doubled; but the Tamil *ch* is doubled very frequently, and if it were represented by the Roman *ch*, we should meet the barbarous combination, *chch*, in almost every line. We should thus also be wasting two *h's* on a compound which has no aspirate in it, and that

in a language which possesses no aspirate whatever. For these reasons it appears to me that *ch* may best be transliterated by *c*, a letter of which no other use has been, or can be, made in the Indian languages, and which, therefore, can be used for this purpose without any danger of misapprehension. On this plan, the Sanskrit *c* and *ch* would correspond symmetrically to *j* and *jh*, and the awkward compound *chch* would be replaced in Tamil by *cc*.

Whether this suggestion be finally adopted or not, neither *c* nor *ch* requires the help of any diacritical point. For this reason I think the French *cedilla* c less suitable.

It will be observed that I have adopted the English *sh* as the representative of the peculiar Sanskrit " *s* of Vishnu", which is sometimes represented by *ṣh*, and the English *s* as the representative of the Sanskrit *s*. It is therefore, only the first of the three sibilants, the " *s* of Siva," which will require some distinguishing sign.

(2.) We now come to those Indian sounds or characters which cannot be represented by the Roman character without the aid of accents or points. It will be seen that characters of this class are not numerous, and that they can be provided for by the use of two, or at the utmost three, distinguishing signs.

(*a.*) The first set of sounds requiring our consideration are the long vowels. The necessity of distinguishing long vowels from short in each of the Indian languages cannot be disputed. This is a necessity to which the Roman character must bend. All that is required, however, to meet this necessity is to mark every long vowel with an accent. It will then be understood that every accented vowel is long, every unaccented one short. The sign used for this purpose may either be the sign of the acute accent, as *á* or that of the circumflex, as *â*, or the ordinary prosodial sign of length, as *ā*. This point should be settled by practical printers. For cursive writing, I suspect it will be found that the last of the three signs, the simple horizontal line, is the easiest.

The only condition for which I would stipulate is, that the accent or sign by which a vowel is made long shall not be used for any other purpose. This appears to me to be a fatal objection to

Prof. Monier Williams' use of the acute accent as the sign, not only of long vowels, but of the first *s* of the Sanskrit sibilants, e. g. *dar'si.* A dot over the *s* and a horizontal line or acute accent over the *i* would involve no perplexity.

The Sanskrit vowels *ri* and *rí*, the vowel *lri*, which is found in only one word in the language, and *lrî*, which never occurs at all, may safely be dispensed with. The difference between the so called vowel *ri*, and the syllable which is composed of consonantal *r* and *i* is more a fanciful than a real one, and so far as it is real, it consists merely in a slight peculiarity in the pronunciation of *i* after *r* in certain words. It does not appear to me that any distinguishing sign is required; the ordinary characters *r* and *i* will suffice. Williams distinguishes this vowel *r* by a dot underneath. The abandonment of the dot in this connection will enable us to represent in this manner one of the peculiar *r*'s of the south Indian languages.

Thus, the help of a single simple, unmistakeable sign enables the Roman character to express each of the vowel sounds of the Indian languages. Certainly none of the Indian systems can vie with this in simplicity. In Tamil alone there are 17 different signs of length employed for distinguishing the long forms of the five simple vowels!

(*b.*) The second class of sounds for which the Roman alphabet requires to make some special provision, is that of the "cerebral" or lingual sounds. These are the *t*, *th*, *d*, *dh* and *n* of the third row of Sanskrit consonants, with the corresponding letters in the other Indian alphabets, to which I would add the peculiar *l* or *rl* of the Vedas and the Dravidian languages, and the harsh lingual *r* of the same family of tongues.

The six lingual consonants differ from the dentals, the consonants of the next row, only by a certain peculiarity of pronunciation. The most natural way of distinguishing them from the dentals would be by adding to them some distinguishing mark, and this distinguishing mark should be affixed in the same way to them all. Instead of adopting some such plan as this, the Indian alphabets use two totally distinct sets of characters, thereby in-

creasing the number and complexity of the alphabetical symbols without any necessity.

The method of distinguishing the corresponding lingual sounds of the Ostiak adopted by Castrén, was to append to the ordinary Russian character a little hook or tail. Sir W. Jones distinguished these letters by an acute accent affixed to one side, e. g. *t'a*. The method generally adopted of late is that of placing a dot *underneath*, which seems to be the easiest and best method of accomplishing the object in view; and if, as I propose, no other dots or marks are placed beneath the lines except those which denote lingual letters, no practical difficulty can arise.

I have added to this list of letters dotted underneath the hard lingual *r* of the Dravidian languages. I distinguished this in my Comparative Grammar by the large *R*, but this plan would preclude the use of the character as the capital of the ordinary *r*. Mr. R. Anderson denoted it by a double *r*, but this would lead to confusion, and would render it necessary to represent the doubled form of this character, which is very common in Tamil, by *rrrr*! As the sound of this *r* bears nearly the same relation to the ordinary semi-vowel *r* that the lingual *t* does to the dental, being originated by a peculiar twirl of the tongue, it appears to me that the best plan will be to class it at once amongst the linguals, and to distinguish it like them, by a dot *underneath*.

(*c*). The Tamil and Malayalam have a deep lingual *r* to which I should here refer. This is pronounced in some districts like *zh* or *rzh*, in others exactly like the lingual *l*, but the most classical pronunciation of it closely resembles the sound of *r* in the English word, "tar." I regard it therefore as a species of *r*. It has been suggested that *z*, having no place in the Indian alphabets, might be used for this purpose. Z, however, will be required for Hindustani. The ordinary Roman *r* being required for the equivalent Indian letter, I propose that this peculiar South Indian *r* be represented by *ṙ*, with a dot *above*.

(*d*). We now come to the nasals, including *Anuswára*, a class of sounds which involve more difficulty than any others.

The consonantal nasals *ṇ*, *n*, and *m* present no difficulty; the

difficulty relates to the first two consonantal nasals, which are commonly transliterated by *ng* and *nj*, and to *Anuswàra.*

(*a*). I begin with *Anuswàra.* This is the character which in Sanskrit, and in all other Indian alphabets except the Tamil, is used in certain conjunctions as the common representative of *all* nasal sounds. It is sounded like *ng* before gutturals, like *nj* before palatals, like *ṇ* before linguals, like *n* before dentals, like *m* before labials and at the end of certain words; and before *h*, where it is most appropriately used, its sound is nearly that of *ng*.

In reality this character is not at all required, the great latitude of sound which is accorded to it perplexes, instead of simplifying the alphabet, and each of its sounds might with great advantage be represented by the consonantal nasal which is equivalent to it. The substitution for it of the consonantal nasals is indeed to a certain extent optional in all the Indian alphabets, and what is optional in other languages is the rule in Tamil. The Tamil rejects *Anuswàra* altogether, using the consonantal nasals instead, and gets on perfectly well without it. The *best* course would, I have no doubt, be to follow the example of the Tamil in this matter; as however the scheme now advocated is that of substituting the Roman *characters* for the Indian, leaving Indian modes of spelling untouched, the second best course is to provide a representative for *Anuswàra*, which shall be used with the same latitude until people learn to lay it aside. As we are not allowed to change about from *n* to *m* as circumstances seem to require, but must keep to the same letter throughout, it appears to me that *m* is the most suitable character to be used, to be distinguished from the consonantal *m* by a dot *above.* People will learn in time to lay aside the dot where it is not required, as at the end of neuter nouns.

(*b*). The nasal of the guttural row of consonants which is pronounced like *ng* in English may best, I think, be transliterated by ṅ with a dot above. This is the best representative of the *Anuswàra* before each *h* and of the obscure final *Anuswàra* of Hindì words. In those instances people will naturally prefer *ṅ* to *ṁ*, and that will help forward the abandonment of *ṁ*. The objection to

the use of the English *ng* as the representative of the guttural nasal is that it is a double consonant. The *n* alone will be found to be quite sufficient, with the addition of a dot, seeing that it will always be followed, except in a very small number of instances in Tamil, either by *k* or by *g*. Even the dot, indeed, may be dispensed with in time.

(*c*). The nasal of the palatal row which includes *c* and *j* has commonly been represented by *nj* or *jn*. The use of double letters, however, for transliterating single ones is objectionable. This sound must be represented by *n*; the only question is, how is this *n* to be distinguished from others ?

The Germans sometimes represent it by *m* with the addition of the Spanish nasal sign, sometimes by *n* with the same addition, sometimes simply by *n*. Where this letter is followed by *ch* or *j*, *n* alone might suffice, but it will require some distinguishing mark when it is used, as in sometimes is in the South, as an initial. I therefore suggest the use of the Spanish nasal sign with *n*, e, g, *ñ*.

This will only be required, however, when it is initial. I fully anticipate, indeed, that in due time people will lay aside the greater number of these marks and dots, when they find that they can be dispensed with, as I believe they often may, without inconvenience ; *n* alone will be found sufficient in time for every nasal except *m*. In cursive writing, and even in print, a horizontal line over the *n*, e. g. *n̄*, will sufficiently represent the Spanish nasal sign.

(*d.*) The half *Anuswàra* of the Telugu does not appear to require any written sign. The *Anuswàra* itself may be used instead of it by those who wish.

(*e.*) The only letter that still requires to be provided for is the first of the three sibilants of the Déva-nágarí. For this I would propose *s* with a dot *above*. The dot below is reserved for linguals, the dot above is therefore the best sign for those few other letters that require a distinguishing mark.

Visarga is quite sufficiently represented by a final *h; ardhákára* by the English apostrophe.

The apostrophe will also be generally useful, in languages in which *sandhi* prevails, as the sign of elision.

Note.—It is desirable to make an observation or two here with respect to the application of the Roman letters to Tamil. The Tamil wholly rejects the aspirated consonants of the Sanskrit, together with the separate aspirate *h;* it rejects *Anuswára*, and in the classical dialect it ignores *ṡ*, *sh* and *s;* but the chief peculiarity of its system is, that it rejects all the sonant or soft consonants of the Sanskrit and the other alphabets, and uses only the hard consonants or surds. Acting on this principle it rejects *g*, *j*, *ḍ*, *d* and *b*. These letters, therefore, will not be required in the Tamil country, except in words belonging to Sanskrit or to any foreign language which are quoted as foreign.

Whilst the Tamil rejects the characters referred to, it does not reject the sounds which they denote, *k* is pronounced as *g* when it occurs singly in the middle of a word or after a nasal, as *k* at the beginning of a word and when doubled, and a similar rule applies to the other letters.

As this peculiar arrangement is not an arbitrary one, but one which springs from a law of sound that is characteristic of the language, it cannot safely be set aside on the introduction of the Roman character. For some time, at least, each Tamil consonant must be transliterated exactly as it stands, irrespective of the sound it receives. Whenever the Tamil *k* occurs, it must be transliterated by the Roman *k*, and it must be left to the Tamil ear, as it may safely be left, to pronounce it soft, as *g* or *gh*, where it is so required. If this rule is not attended to, the popularisation amongst the Natives of the use of the Roman character will be seriously impeded.

For similar reasons, wherever the Tamil uses certain characters as the symbols of peculiar compound sounds, the exact equivalents of those characters should be used in transliteration, and no attempt should be made to produce the same result by means of any English combinations of letters. Thus, as the Tamil uses *n* and the harsh lingual *ṛ* as the symbol of the sound *ndr*, and double *ṛ* as the symbol of a sound resembling *ttr*, we must be content with imitating the Tamil in this and transliterating those letters just as they stand. It will simply be necessary to explain to learners, as hitherto, how those combinations are to be pronounced.

We have now gone over the entire ground, in so far as the peculiarities of the purely Indian alphabets are concerned, and it is my impression that we have not met with any insuperable difficulty. If the change is impracticable, at all events the impracticability does not appear to consist in the impossibility of adapting the Roman characters to the Indian sounds.

The following view of the whole of the proposed modifications will show how few and easy they are, and how little trouble is involved in the plan.

Proposed Indo-Roman Alphabet.*

Vowels.

a, á; i, í; u, ú; e, é; ai (or ei); o, ó; au.

Anuswara ṁ (or ṅ). *Visarga* h.

Consonants.

Gutturals, k, kh; g, gh; ṅ.

Palatals, c, ch; j, jh; ñ or n̄.

Linguals, ṭ, ṭh; ḍ, ḍh; ṇ.

Dentals, t, th; d, dh; n.

Labials, p, ph; b, bh; m.

Semi-vowels, y, r, l, v.

Dravidian do, ṙ, ṛ, ḷ.

Sibilants, ṡ, sh, s.

Aspirate, h.

A very important advantage, as it appears to me, of the scheme exhibited above, is its simplicity. If it should be modified on further consideration, I trust it will only be for the purpose of making it more simple still. An accent to distinguish the long vowels and a dot variously placed for distinguishing peculiar consonants, cannot cause perplexity, and ought to be made to suffice. There are doubtless a few points of detail which require to be more fully

* Note.—Should the English *names* of the Roman characters be introduced, e. g. *ay, bee, aitch, el,* &c.? By no means. The characters themselves stand upon a different footing from the names which happen to be given to them in England. The Indian modes of denominating the letters are better than the English.

considered, especially with reference to the necessities of rapid manuscript writing, but I do not think that any difficulty even in details will be met with, which might not easily be settled by persons acquainted with the subject.

I may here add that the plan of modifying foreign characters to enable them to express the sounds of the Indian languages is not a novelty, as appears sometimes to be supposed The experiment has already been tried with a character considerably inferior to the Roman, and the result of the experiment is the character in which Hindustani is generally written. What is that character but Persian (originally Arabic), with the addition of certain symbols found to be necessary for denoting peculiar Indian sounds? It is not alleged that the Persian character cannot be applied to the Indian languages, or that its substitution, with certain modifications, is impracticable. The possibility of doing it has been proved by the fact of its having been done. *Solvitur ambulando.* It is only the substitution of the Roman characters for the Indian that is now regarded as impossible; and yet every one must admit, on the least consideration, both that the Roman character is preferable in itself to the Persian, and that the modifications of the Persian which constitute Hindustani are far less easy, simple, and systematic than the modifications of the Roman character which have now been proposed.

The following are the steps which I beg to recommend should be taken, for the purpose of introducing the plan now advocated, and which appear to me to be likely to be attended with success. I state them in the order in which I think they should be carried out.

1. The encouragement of discussion respecting the merits of the plan in general and questions of detail, by persons conversant with the Native languages.

2. The adoption by Government of such measures as are considered to be best adapted for the settlement of the details of the plan on a comprehensive principle.

3. The publication of a series of alphabetical sheets and elementary books in the various vernaculars, containing exemplifications of the working of the plan, and explanations of points that may be thought likely to appear obscure to Natives.

4. The introduction of the plan, after these preliminary steps have been taken, into all schools supported by Government or receiving grants in aid, not in supersession of the Native characters, but as a supplementary system of writing.

By the time matters reached this point, the public mind would be prepared, I anticipate, for carrying the plan considerably farther.

I have, &c.,

R. CALDWELL.

IDEIYANKUDI, TINNEVELLY,
2nd *May*, 1859.

To

SIR C. E. TREVELYAN, K. C. B.,

Governor of Madras.

P. S.—Since this paper passed out of my hands, I have been in correspondence on the subject with the Revd. G. U. Pope, whose talents and acquirements are well known in this Presidency, and as I find that he also is strongly in favour of the introduction of the Roman character, I presume that it will be found to have a larger number of adherents than I imagined.

In discussing details with Mr. Pope, I have adopted some of his transliterations, in preference to those which I had suggested; but as my object in preparing the preceding paper was, not to attempt to settle details, but to draw attention to the subject and to promote discussion, I have thought it best to leave every thing just as it was written.

R. C.

III. *On the occurrence of Crystalline Limestone in the vicinity of Trichinopoly.* *By* W. KING, ESQ., *Geological Survey of India.*

(Communicated by Government.)

WHILE surveying the Moosery and Toriore talooks of the Trichinopoly District, I observed some blocks of Crystalline Limestone in the bund of a tank near Comungalum. Subsequent observation showed that this rock occurs *in situ* in two places: at Naivailie, about sixteen miles North-west of Trichinopoly; and at Mootum four miles further North and on the West side of the Tyaur river.

These two localities occur in a metamorphic district consisting of beds of micaceous, hornblendic, and quartzose gneiss, more or less foliated and in many cases particularly in the South-western part of the Toriore talook assuming a perfectly schistose character. They are situated almost on the Northern edge of a great development of granite and quartz, either in the form of veins or protruded masses, which forms a belt more than eight miles in width extending along the Northern bank of the Cauvery from a point North of Trichinopoly into the Coimbatore District. Generally throughout this granitic region the direction of the foliation of the metamorphic rocks is E. N. E. = W. S. W. while the average dip of the beds is 45° to the North.

At Naivailie the limestone appears at the Eastern end of the tank as a bed 6 or 7 feet in width cropping up between bands of gneiss. From this point it extends in an E. S. E. direction for a little more than a mile, where it takes a new direction E. N. E., and so continues for another mile. Here another band joins it which may be a continuation of a smaller one occurring at Naivailie about 100 yards North of the first.

Throughout the greater part of its extent the main band preserves an uniform thickness of 6 or 7 feet, but widens out at one place (where there is a large granite vein and much contorted gneiss) into a surface of more than 50 yards square. The bedding of the gneiss rocks in the vicinity is quite distinct, the dip being

vertical, so that the vertical extent of the limestone may in all probability be very great.

Immediately adjoining the main band on its Northern side is a thick bed of quartz rock, and on the Southern is a bed of irregularly foliated hornblendic and felspatic gneiss succeeded by a large vein of granite some yards in width. This vein assumes towards its interior the structure of graphic granite. It is here that the change in the direction of the band takes place.

The limestone is generally of a grey color, but this changes to a white and in some places to pink. Its structure is granularly crystalline, resembling loaf sugar, at the same time the crystals are not so large as to render the rock friable. The foliation, which, as a rule, is extremely imperfect, is parallel to that of the gneiss, in this case the same as the direction of the band given above. The folia consists of mica and chlorite, these sometimes disappearing altogether and never exceeding an eighth of an inch in width. Fragments of contorted gneiss, and small nests of quartz, chlorite and calc spar occur in it to very small extent, while in places the limestone itself appears to have been squeezed in between the folia of the gneiss and separated into lenticular patches.

At Mootum the band of limestone is nearly a mile in length, but not so broad nor so much of it seen, as that at Naivailie. It presents the same characters, and the rocks of the vicinity are the same as at that place; the only difference being that the general color is pink and the development of granite not so great.

As an industrial resource of this district, the occurrence of crystalline limestone is very important, owing to its being useful as a building material in the form of stone, marble, or lime. In the present case, the uniformly close texture, the pleasing colors and semi-translucency, and the comparative freedom from foreign matters, are qualities which render it peculiarly well adapted for these different purposes. I had some of the light grey limestone burnt by the chunam-maker of the place, and specimens of different colors roughly polished in Trichinopoly; and the results were most satisfactory. The marble is fine grained and clouded, while the colours come out clear and decided; the lime was of excellent quality.

IV. *Memorandum of the Fort and Hindoo Temple at Vellore and others in its neighbourhood, as recorded in A. D.* 1815. *By* LIEUT. H. P. HAWKES, *Sub Asst. Comy. Genl.*

ABOUT 450 years ago (A. D. 1365) an inhabitant of Vizianagram, named Rooma Reddy with his family arrived in this country en route to Ramiseram. On his march he halted several days at a village called Valapady near Vellore.

The inhabitants of the village, finding Rooma Reddy to be a good soldier, begged his assistance against a large body of robbers who were concealed in the neighbouring forest, particularly where the Fort of Vellore now stands, and who had pillaged all their property. On hearing this, Rooma Reddy with his brother took the necessary steps to secure them and put them all to death.

The inhabitants being overjoyed at their deliverence from these robbers, reported the circumstance to their head chief the Rajah of Guijee. He gave them permission to encourage Rooma Reddy to settle in the village, and ordered them to treat him well and give him every assistance in their power.

One day Rooma Reddy, accompanied by his dog, entered into the jungle to look for game. Of a sudden a hare made an attack on his dog on the spot where the sawmy pagoda is now built. Rooma Reddy being surprized and astonished at such an unusual occurrence, thought it must be some interposition of the gods. He returned to his house and dreamed that night that there was a lingum or stone sawmy beneath the white ant hill (near which the hare had attacked the dog), and that it was his duty to take it out and build a large pagoda on the spot, he also dreamed that treasure would be found by searching a certain cave in the hills.

Rooma Reddy discovered the treasure of which he had dreamed (all in gold) and applied to the Raja of Guijee for permission to build a fort and a pagoda on a certain spot of ground. This was granted, and he employed a large number of workmen who cleared the jungle and laid the foundations in a most durable manner. He first built the sawmy pagoda, covering the lingum stone sawmy,

now to be seen in the Arsenal and which he called "Telecauteserai."

After a period of 25 years (1390)? the Fort was nearly completed, when Kistna Deva Rayah, king of Anaygoondy in Mysore invaded the Carnatic, took possession of all the fortified places, and amongst others of Vellore Fort where he fixed his throne. He erected the Rajmahal and other buildings, and sunk a tank called Sooriagoonta,* (reservoir tank) also a well† in the pagoda surrounded by a stone choultry as an offering to his god.

Moreover he made a canal† from the Palar river to supply the well† with water : he reigned about fifty years.

Kistnajeeamah, his wife, established a pettah, and built two sawmy Pagodas on the bank of the Palar river about one mile from Vellore.

His brother, Ganaput Royal, built the fort of Arnee by the same workmen who made the plan for the fortification of Vellore.

On Kistna Deva Rayel's decease, his brother Atchoota Rayel succeeded him on the throne, and built a Rajmahal at Chandernagherry.

After the demise of Atchoota Rayel, Ram Rayel his brother was placed on the throne.

By reference to several books of Gentoo poems, now in possession of several inhabitants here, it will be seen that the descendants of the Rayels reigned in this as well as in Mysore and other countries (about 200 years ago), and that after that they were succeeded by the Mahrattas.

Shahoo Raja a Mahratta king entered into the Carnatic with his army, and took possession of Vellore and other forts where he found much treasure. He built several hill forts, on various spots

* This tank which is more than 150 yards square is still in existence, and contains a sufficiency of water to supply the Fort for 2 or 3 years to which it is conveyed by pipe, it is about 800 or 1000 yards south of the Fort.

† This well in the pagoda is also in perfect repair, and there is every reason to believe that the communication with the river here mentioned, was actually made as there is a constant flow of clear spring water into it. The river is distant about a mile and a quarter north.

captured by him, and amongst others he built forts near Vellore, Vizagapatam, Sazram, Gozaran, Kylassaghur and Carnatic-ghur ; he also sunk a tank on the hill of Sazaron which he named Guija Saugor.

On his return to his native country (Poona), he left one of his principal chieftains named Rajah Ram Chutterputty to govern this country. Rajah Shahoo's servants, a washerman and a chuckler, built with the Rajah's permission two hill forts in the neighbourhood of Vellore called Chumbar-ghur and Dhobie-ghur.

The Mahrattas reigned in this country about 100 years, and were succeeded by the Mussulmen.

About 150 years ago (1665 ?) a mussulman named Khan Khannah was sent by the King of Delhi to govern the Hydrabad Soubah and its dependencies. He appointed Nowab Mahomed Khan as Khilledur of Vellore, &c., viz. Kylassaghur, &c. His son murdered some of the dancing women, belonging to the sawmy pagoda in the Fort of Vellore, from which circumstance the worship of Telacunteeswerim sawmy was discontinued and the valuable jewels and images belonging to the pagoda were concealed under ground. On the decease of Nawab Mahomed Khan, his son Nawab Abdulla Khan succeeded him and commanded the fort for several years. He laid the foundation of a fortification in Chedpary tank, but did not proceed with the work. He also built a large terraced house, a stone choultry, sunk a well, and established a village called Abdullapoorum about three miles from Vellore on the high road to Seringapatam. By reference to an Arabic inscription cut on the stone lying in the gateways of the fort, it may be seen that he altered the gates of Vellore. Abdullah Khan had a Hindoo woman called Nazook Rutnum whom he loved much, but at last he murdered her in a fit of drunkenness, and built a tomb stone near Conaveethum about half a mile from the fort on the left hand side of the road? This he ornamented with a gilt top and endowed it with several cawnies of land, the revenue of which was to defray the expenses of the daily and annual ceremonies. Abdullah's tomb is situated in a stone choultry about $2\frac{1}{2}$ miles from the fort close to the Chedepary tank.

Nawab-Nansur Sing, son of Nawab Azuf Jah, Soubadar of the Deccan, was directed by the king of Delhi to govern the Carnatic, and on his death Nawab Daood Khan, accompanied by his Dewan Nawab Saadut oola Khan, came to this country.

On Daood Khan's return to Hyderabad he made over the Government of the country to Saadut oola, who came to terms with all the petty Rajahs, excepting the Rajah of Guijee, who refused to pay his revenue, assigning as a reason that he had expended all his resources in building seven hill forts at Guijee. Nawab Saadut oola not considering this a satisfactory reason, seized Guijee and took Dar Sing prisoner. The history of Dar Sing is written in the Gentoo language, as also that of his wife who suffered herself to be burnt with him. His tomb is situated at Tutta Petta near Guijee.

During the period of Nawab Saadut oola Khan's Government, (about one hundred and ten years ago), he granted to his brother Nawab Gholam Ali Khan, the jagheer of Vellore and its dependencies.

Gholam Ali Khan had four sons, viz., Ali Dost Khan, Bauker Ali Khan, Saduk Ali Khan, and Acbur Mahomed Khan. On Gholam Ali Khan's decease, his property and jagheer were divided amongst his four sons, and Nawab Bauker Ali Khan succeeded to the Fort and district of Vellore.

During the time that Bauker Ali Khan held the jagheer (about 90 years ago,) a great famine happened in this country, at which period he established a Lungur Khana to support a number of poor people and deepened the Chedpary tank. He made, moreover, a nullah from the Palaar river to supply the tank with water. Nawab Bauker Ali Khan had two sons, Gholam Rajah Khan and Gholam Martuzah Khan. The latter succeeded his father after his death in the jagheer of Vellore, and built a hill fort near Vellore which he called Moortuza-ghur. His wife founded a village called Baukerpooram, and made a garden near it called the "Barrier gate," at present the indigo works of Mr. Jollie.

Wallajah, the Nawab of the Carnatic, demanded Gholam Moorteza Khan's daughter in marriage for his son Nawab Oomdut Oomrah, and on being refused he leagued with Lord Clive, enter-

ed and took possession of Vellore (about 60 years ago), and appointed his own Khilledar. The Fort of Vellore was afterwards made over to the British Government. Wallajah having taken Vellore, took the wife and daughter of Gholam Moorteza Khan into his own house, and sent the jagheerdar to close imprisonment at Trichinopoly.

The tombs of these Mussulmen are situated in a Muckan adjoining Colonel Webber's house in the Pettah of Vellore.

Translation of an inscription taken from a stone which covered the well inside the Arsenal of Vellore.

* * * * * * *

Having compelled him to look for shelter in the woods, Sheeralan or Chera armed with a bow and arrow, well fitted for using in battle, destroyed Caudalore encircled by the sea, and cut the gold crowned heads Vomallavan (*i. e.* the strong vallanen) and Kaunacucha Kanta, (*i. e.* the "guardian defender" a title of royalty), so that the king of Kanga took fright.

He advanced his standards, took Tamilpauni, putting the Raja (Cavalan) to fight, and striking his elephants so that they wallowed on the ground roaring, and defeated all his enemies. He likewise put to flight Medusal Vissagan (*i. e.* "a large sword") by means of his army while his father and mother shed tears, having exhibited his labour and caused to be imprisoned the emissaries deputed by Ahava Malla, who took fright at his army, his Vallout (king) wounded them, and Ahava Malla who was armed with a bow and arrow with his army under the flag of a palmyra tree.

* * * * * * *

NOTE.—The commencement and end of the above are illegible.—H. P. H.

V. *Report on Lead Ores in the Cuddapah District. By* P. W. WALL, ESQ., *Mineral Viewer.*

(Communicated by Government.)

IN that portion of my previous report which relates to the locality described as near Nundiallumpett, in the Cuddapah District, I pointed out the connection existing between a number of isolated points of occurrence of the mineral under consideration as indicating one continuous vein or lode having throughout a uniform course or direction.

It became, therefore, my object to pursue an examination of the country in the direction thus indicated from the two extreme points, with the view to ascertaining if a further continuation of the lode could be traced out.

In the northerly direction, the course indicated leaves the hilly ground and passes for some considerable distance over an area of level country, the surface of which is covered with soil and alluvial matter, and most unfavorable for investigations of this nature; from the southern extremity, however, the course is over a portion of the mountainous range, my attention was therefore directed to this part, and I have succeeded in discovering numerous other points in the line of its course and tracing it for a further distance of four miles.

The ore is thinly scattered in this continued portion occasionally disseminated through the gangue, but more frequently lining the cavities, as occurs at the surface at the previously described parts of it.

At the most southern point as yet observed the rock becomes more siliceous and scattered crystals of Copper Pyrites occur in it.

A map of the locality with the course of the Lead vein shown by a broad red line is herewith appended.*

The vein throughout this latter extension continues to preserve the uniform character with that of the other portions as observed at the surface, its cellular or cavernous structure being throughout a very marked feature which enables it to be readily distinguished when making its appearance at the surface.

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* Vide Pl. II.

On the western side of the lode, and at a distance of about $\frac{3}{4}$ of a mile from it, there occurs a branch vein, this is marked on the map a little south east of the village of Nagsanpilly.

At the point of observation it is split into two portions about 2 feet apart, each being of a thickness of 4 inches average.

Being of small dimensions it is rich in mineral, the whole being made up of ore and clay, there is also a considerable admixture of carbonate of Copper.

The direction of it is north east and south west with an underlie of 45° to the south east.

Its course traverses a series of ridges and nullahs and in this respect is very favorably circumstanced for working.

The place where opened by my excavations is situated about 150 feet above the level of the plain, so that a considerable extent could be worked vertically by means of headings into the hill side without any fear of interruption from water, and with the greatest possible facility for getting rid of the debris; longitudinally also a great extent could be mined under the same advantageous circumstances on account of the undulating surface of the country.

The part at present exposed is $1\frac{1}{4}$ mile from the point where, if its present direction is maintained, a junction would be effected with the main lode, approaching which it may be expected to increase in richness.

In the opposite direction there is about $1\frac{1}{2}$ mile of the same undulating country it probably traverses before reaching the plain.

There is every reason to believe it will not be found to die out in this last named direction, inasmuch as the mineral I discovered to occur again to the south at about 7 miles distant, and where the course of it, if continued, would intersect the Penrair river.

The range of hills traversed by the southern portion of the main lode as also by this supplementary branch is a portion of that called Lunkamulla, and so named on the Ordnance map. The place alluded to in my previous report under this name is the branch vein now described.

Close to the village of Coteloor on the northern bank of the Pennair river, a vein of white quartz crosses the bed of the river nearly at right angles, in this substance occur tolerably thickly scattered large crystals of cubical Galena.

The direction of this vein is about N. N. E. and S. S. W.

In this it is nearly parallel to the main vein or lode passing Jungumrauzpully, but it is at the same time in a line with the direction of the branch vein from the Lunkamulla hills, it is not therefore certain if this is a separate lode or continuation of the above mentioned branch, in either case its occurrence is of importance pointing out the direction for further investigations: it is not favorable for being explored at the spot itself on account of its situation being in the bed of the river.

A substance called in Hindoostanee Soorma, has been lately mentioned to me as having been obtained from near Gunganapully or Chintaconadinna. But lead and antimony are sold in bazaars under this name, and it is not improbable that this locality may also be a site for Lead ore, and a continuation of the Coteloor vein occur there.

The Coteloor vein traverses a flat bedded limestone, much used for building purposes, and locally known as the Poospagherry stone, through which it has burst, this rock is seen for some distance along the northern bank of the Pennair at the village of Podatoor, Jummulmudgoo, and in continuation of that line again at Cond Oopulpaud on the borders of Bellary and Cuddapah, its western boundary passes from this last named point to near Banganapilly and thence to Calwa (Kurnool), and appears to extend nearly to the base of the Nullimulla range, a line from Coteloor through Nundial in Kurnool forming its eastern boundary, it has a very slight inclination about 5° to the N. E., it overlies a series of rocks consisting of limestone, conglomerate, banded jasper, clays and sandstones and conformably with them; the entire series is best seen at Cond Oopulpaud near Rialcherroo in Bellary, portions of it at Gundicottah and near Calwa.

The small strip of country bounded by the limits as above defined, is one in which the rocks sedimentary in character have remained almost undisturbed since their original deposition. On either side are evidences of great changes having taken place, on the east the elevation of the Nullimulla range has abruptly broken the continuity of these beds forming an extensive throw or fault, while towards the west they rise into a range of hills of moderate elevation terminating in a ridge steeply scarped on their western

face, their eastern side sloping with the inclination of the beds of rocks to the N. E. To the west of this ridge the features of the country are entirely changed; isolated hills rugged on all sides, or pyramids with their sloping sides covered with rounded boulder-like blocks give a decided character to a country composed as this is of protended and altered rocks intermingled. It is in this line of country so composed that the Kurnool lead occurs.

The rock of the country traversed by the Lunkamulla branch vein consists of a clay slate and shale, of this a large portion of the range from the Chey Air river to the Nundicannama Ghaut is composed, and in it the excavation for working the mineral would require to be made. It is a material easy of excavation, but all mining works in it would require timbering for their support, in this respect, however, nothing beyond a fair average cost is to be feared.

Timber suitable for the purpose would no doubt be found amongst the numerous varieties that appear to exist in the adjacent jungles, it would of course be a matter of experience to ascertain the description most adapted to withstand the damp of underground works; in the event of any difficulty in this respect the cheap labor of the country would enable a dry rubble arched lining to be adopted as the excavations in the rock of the country would afford a flat bedded material sufficiently strong and adapted for this purpose.

Assays of samples of the ore from various parts of the vein have been kindly undertaken by Dr. Scott, Assistant Assayer at the Mint; they are exceedingly satisfactory as showing the ore invariably to contain a valuable quantity of the precious metal.

Considering the number of spots this mineral is now found to occur at in this locality, its existence in regular lodes whose course can be readily traced at the surface, its containing occasionally a most extravagant proportion of silver, and invariably a quantity to give considerable value on its account, I am of opinion that a fair field is here presented for commercial enterprise, in mining undertaking, and that works judiciously conducted would lead to the development of extensive mineral resources in this District.

The small branch vein above mentioned offers a most available as well as promising spot for a commencement to work the mineral, as so considerable an extent of ground could be explored with

comparatively little outlay, a heading along the course of this vein 4 feet high and 3 wide would, I estimate, yield in dressed ore 18 cwt. per lineal yard if proving of no greater strength further in that at present shown at the surface, the cost of excavating the above would in England be about 15 to 25 Shillings dependent upon the price of timber in the district and other local circumstances. In this country it should not be estimated for at a lower rate, though even tually with the experience the workmen would gain by time it might be possibly done cheaper, taking the average of above prices

£1 per yard or say per ton of dressed or yielded.. . .Rs.	12
Dressing and washing........................ ,,	10
Per ton of ore, Rs.	22
Carriage to Madras........................... ,,	30
Contingencies at 10 per cent.................. ,,	5
Rupees.,	57

or say £6 per ton.

At this cost the surplus beyond the requirements of the country would yield an excellent profit by shipment to England, where it would sell for not less than £12.

The mountainous character of the country through which nearly the whole extent of the mineral has now been traced would greatly facilitate the commencement of operations, and considerable amount of work could be done without the necessity of any outlay for pumping machinery. It may also be here mentioned, that the art of separating substances of different specific gravity by the aid of running water, is one that is practised very generally and with considerable success by the Natives of India, so that so far as the washing and dressing the ores is concerned, there is for this branch of the business every facility afforded in work people of this class ready to hand and at a very cheap rate.

In my late tour I also visited a part of the Nellore District for the purpose of inspecting the sites of occurrence of Copper ore. The principal locality is at Garemanepentah in the Pamur Division.

It is found in small bunches between layers of gneiss which forms the prevailing rock of the country, nowhere did I see any trace of veins, their existence in the District however may fairly be inferred I think from these numerous isolated patches of ore, the general features of the country pointing towards the Nullimulla

hills as the most probable locality in which they will ultimately be met with, this being as before stated the line of great disturbance that has taken place, and shown to contain regular mineral veins with traces of Copper in them.

Examination of Ores of Lead, showing the per centage of Metallic Lead and No. of ozs. of Silver contained in one ton of the Mineral.

No.	Mineral.	Locality.	1st Examination. Lead. Weight.			1st Examination. Silver. Weight.	Oz. per ton.		2nd Examination. Lead. Weight.			2nd Examination. Silver. Weight.		
	oz		dwt.	grs.	Per centage.	grs.	oz	dwt	dwt.	grs.	Per centage.	grs.	oz.	dwt.
I	1	Buswapoor.... (Door Talook of Cuddapah.)	13	6	66·159	0·110	8	4	14	12	72·407	0·473	35	7
,,	1	do. (slime)	12	4	60·820	0·143	10	14	12	12	62·500	0·143	10	14
II	1	Jungumrazpully.	13	8	66·614	0·143	10	14	13	22	69·664	0·176	13	13
,,	1	do. (slime)	4	12	22·407	spoilt.	..	..	6	19	33·992	spoilt..	..	..
III	1	Lunkamulla....	14	1	70·121	0·121	9	2	15	7	76·371	0·110	8	4
,,	1	do. (slime)	7	6	36·278	0·110	8	4	9	5	46·000	0·110	8	4
IV	1	Gazerpully, Kurnool..	11	21	59·450	0·066	5	19	11	3	55·714	0·066	5	19
,,	1	do. (slime).....	4	18	23·752	0·044	3	6	4	4	20·807	0·033	2	9

On some of the Silver Lead Ores, in the Kurnool District. By P. W. WALL, ESQ.

(Communicated by Government.)

Under the instructions conveyed by Government, I have visited the localities alluded of Gazelpüllly in the Nundicunnamah pass of the Nullimallah Hills and Coilcontla in the Dhone Talook of the Kurnool district.

The mine near Gazelpüllly is situated about seven miles from this village, and at the foot of the range of Hills forming the Eastern Ghauts, which at this part are composed of sedimentary and metamorphic rocks.

The ore occurs in a matrix of sulphate of baryta, from the samples I was able to inspect, in very small quantity;—the indications are such as to lead to the inference that further working would reveal the ore more abundantly distributed.

The matrix however being a very friable material, the cheap native labor of the district, used for breaking and picking the ore, would greatly assist towards rendering the mining of very inferior samples profitable.

The character of the enclosing rocks, is rather favorable for the execution of mining operations in them.

The locality is a very dense jungle ; timber adapted for mining purposes and which is required to be of strength and durability under exposure in wet and damp situations, could no doubt be obtained from it, the ore could also by means of the charcoal procured from this jungle be smelted in the neighbourhood. The clearing of the jungle possibly reducing the feverish nature of the district.

The Coilcontla mine is situated amidst Hills of Granite and other primitive rocks, the ore occurs in a very hard silicious matrix, occasionally very much disseminated through it, much would therefore, require to be crushed and washed, to separate the ore from the enclosing gangue, this would be done with somewhat more labor and difficulty than when dealing with the Gazelpüllly ore, the

cheap labor however of India, would admit of the poorest ores being operated upon even in this case.

In para. 4 of Captain Russell's letter, No. 13, May 29th, 1857, addressed to Government, he speaks of the ore as occurring in scattered nodules and considers them as transported blocks; on account of the heavy monsoon rains falling on the occasion of my visist, I could make no observations beyond the nature of the country in which either this mine (or that at Gazelpülly is situated,) Captain Russell had kindly instructed the Tahsildar at Dhone to endeavour to clear the pit of water, he however reported it as almost impossible at that season of the year. I am therefore not able to offer any remarks from actual observation upon this very important point, in any case however, a vein of ore must exist in the locality and must be struck upon for this to become a mine of importance; in the meantime however, the nodules could be excavated and vein traced out at a very small cost, this being done with profit if the abundance with which they may be found prove considerable.

The per centage of silver that may be expected to be obtained from the bulk of the ore of the Coilcontla mine may, I think, be inferred from a series of experiments that have been conducted by the Acting Assay Master at the Mint, in conjunction with myself, both upon the (40) forty maunds sent by Captain Russell from this place and also upon the individual specimens I brought from the spot.

The average yield as thus ascertained is from twelve to fourteen ounces of the precious metal in the ton of reduced lead, and much above that which would characterise it as an ore valuable for the silver contained, three ounces of silver to the ton of lead being in European establishments worth the expense of operating upon for its separation, the extent to which such operation is there carried on being until no more than ten pennyweights remains in the ton of metallic lead.

The process employed consists chiefly of manual labor, for which the Natives would be, I apprehend, well adapted and readily instructed.

The previous assays however of Dr. Scott, show that occasion-

ally the ore occurs extremely rich in the precious metal, it is usual in the occurrence of argentiferous galena in England and elsewhere, for it to be thus unequally distributed through the ore.

The yield of metallic lead was ascertained, in the experiments above alluded to, to be seventy per cent. of the dressed ore.

The average yield of silver upon all English lead mines was, in 1854, $16\frac{1}{3}$ (sixteen and one-third) ounces per ton of lead, the richest mine giving 84 (eighty-four) ounces, the poorest $3\frac{1}{2}$ (three and half) ounces per ton of metallic lead obtained in the year.

With respect to the ore from Gazelpülly, no further assays could be made, the mineral lately received at the Mint from this place proved, on inspection, to consist almost entirely of sulphate of baryta, with traces only of galena in it.

It is not however for silver only that the mines must be looked upon as of importance; the lead also is a valuable metal, the crude ore, if obtained in moderate abundance, and without any extraordinary expense on account of "dead-work" being in itself of sufficient value for the lead only to bear considerable cost in transit to any part where it may be required to be conveyed for smelting.

The prices of dressed lead ores realized at the Holywell* sales varies from £10-0-0 to £18-12-6 per ton, containing the average per centage of silver, above stated, for English mines.

* *North Wales.*

As an important feature in the Coilcontla mine, I may mention that I am informed it is probable, the Northern Division of the Madras Railway will pass within twenty or thirty miles of its site, and as there does not appear to be much timber in this district, the Railway when completed will offer a facility for conveying the ore to any more convenient part of the country for the purpose of being smelted.

It is however upon the probable produce of the mines that the main question depends, and I think it would be desirable for Government to obtain, at some small cost, further evidence upon this point.

It would appear that in Kurnool and Cuddapah, there are many spots reported to produce lead ore, in addition to those under consideration in this report, as far back as 1820. I find Jangamrauzpilly† mentioned as a locality for silver lead, in Heyne's Tracts on India. Galena from Cuddapah is said to have been reported by the Assay Master at Bengal, as containing eleven per cent. of silver. This would be a silver not a lead mine.

† *Cumbum, (Cuddapah.)*

I am informed by Dr. Scott that he has heard that Captain Blagrave has lately discovered another site yielding this mineral.

I should therefore propose to examine all these reported metalliferous localities, by means of a small extent of excavation at each, for which purpose it would be requisite for Government to sanction a certain monthly expenditure during my operations, say Rupees (500) five hundred.

If Government shall think it desirable to sanction the expenditure I propose, I shall beg to request that the services of a European Corporal and two Privates (1st class Sawyers) of the Corps of Sappers and Miners may, if possible, be placed at my disposal.

I have also to request the sanction of Government to the attachment of two Lascars to my establishment for the purpose of collecting samples of ores, &c., from distant localities : the peons of the Collector of Rajahmundry ordered to accompany me in my survey on the Godavery were not adapted to making the excursions into the jungle which I often required.

Should the indications at any one or more places be proved by this survey to be satisfactory, I shall have the honor of proposing for the consideration of Government that works at such spot be executed by Government (consisting of the sinking of shafts, erecting pumping machinery, &c.,) with a view to the mine being let to be worked by Natives, the ore being purchased from them by Government at a stated value of the metal contained in it, and smelted for the use of the Government establishments, as the Arsenal, Mint, &c., estimates of the cost of any such undertaking, I shall beg to submit as the circumstances may occur requiring the suggestion.

As adapted for these operations, as well as for Public Works generally, I would beg to draw the attention of Government to the Agricultural Locomotive Steam Engines now in great use in England, and to suggest the desirableness of there being one or two in the Government stores to be used on occasions such as those above named; the design upon which they should be constructed, would possibly require to be somewhat altered from that in ordinary use in England, to suit the particular circumstances of this country.

Report on the Silver Lead Ores of Kurnool and other portions of the Ceded Districts. By P. W. WALL, ESQ.

(Communicated by Government.)

IN the previous communication I have had the honor to make in reference to the Lead Ores that had reached Madras, I alluded to the per centage of silver contained in the mineral from one of the localities as being much larger than the average of those ores worked in England and in consequence as being worthy of further attention being directed to.

The chief point therefore to which my attention has been directed in my investigations, during the past season has been to ascertain the circumstances under which the mineral existed, if there were reasonable grounds for presuming it was to be obtained in any quantity, and what were the general conditions under which mining operations would be able to be conducted in the several localities in which it occurred.

The following are the names of the places visited by me at or near which the mineral under consideration exists.

Coilcontla in the Dhone Talook of Kurnool, Gazerpully in the Nundial Talook of the same district.

Jungumrauzpillay, Village and Ghaut.

In the Bundwail Talook of Cuddapah and Buswapoor in the Dhoor Talook of the same.

In addition to the above places, search which I directed to be made in a range of hills called Lunkamulla immediately south of the last named place has been successful in finding the mineral in considerable quantity. It was however only brought to me after I had left the district and I was not able to visit the spot.

Coilcontla is situated about six miles to the west of the village of Dhone in the Talook of that name, the site where the lead ore occurs is $\frac{1}{4}$ mile south of the village.

The surface of the country in the immediate neighbourhood is exceedingly rugged, occasioned by the protrusion of granite hills rising to an extreme height of about 500 feet above the level of the main adjoining valley; dykes composed of felspar, porphyry and trap intersect the granite forming low hills; well marked on account of their dark color in continuous ridges through the country; being apparently of less decomposable matter than the enclosing rock, they have been left protruding from it as now seen; these dykes have a general direction east and west and extend over a large portion of the Ceded Districts, they become more numerous farther southward. At Pennacondah in the south division of Bellary they form a very marked feature in the appearance of the country on account of their number.

In addition to the above there is a large quartz dyke passing near the site of the lead mine as well as one of the same material enclosing large quantities of specular Iron seen near the public bungalow at Yeldoorty, 12 miles distant from Coilcontla, these like the trap dykes have a general direction E. and W.

The hills about Coilcontla are for the most part very bare of timber; a low brushwood occurring at intervals only on their sides.

In the valley between these hills a considerable thickness of sand resulting from the washings of their sides covers over the rugged surface of the rock beneath, the inequalities in which form natural reservoirs for water; into this sand the Natives dig their wells for agricultural purposes and obtain an abundant supply of water through nearly the whole of the dry season; the sinking of one of these pits was the occasion of the discovery at this place of the mineral now the subject of consideration.

The water thus occurring, and in considerable quantity, was a source of much inconvenience to me in endeavouring to examine the ore "in situ," as it would also be in any subsequent mining operations and much increase their cost, especially as the nature of the ground offers little or no facility for assisting the drainage of under ground works by means of an adit level.

On my arrival at Coilcontla in the beginning of January, I found the water in the lead pit standing at between two and three feet only beneath the surface of the ground. I therefore availed myself of the little fall in the surface of the valley and cut a small channel, by which I was enabled to lower the water surface five feet and proceeded thence by such Native appliances as the district afforded to lift out the remaining water to examine the ground from whence the ore had been procured.

Upon reaching the bottom of the pit and clearing it of the rubbish that had accumulated I found the ore to occur in a well marked vein capable of being distinctly traced as far as I was able to lay bare the enclosing rock from the surface sand with which it was covered; about 12 feet of this sand here covers the rock, this and five feet in depth of the vein or rock had been previously excavated, no doubt for the purpose of obtaining the mineral it contained.

At the extreme north corner of the pit, the vein has a width of 2 feet 9 inches, thence southward it rapidly increases within 2 or 3 feet of distance to a width of 4 feet and continues to expand throwing out numerous threads or pipe veins, the main one becoming less rich in ore and eventually towards the south corner totally devoid of it; in the opposite direction the vein appears suddenly to contract to a few inches only in width, my excavation there did not reach the same depth as where the vein has its greatest width.

The vein generally is well defined by its walls of clear amethyst quartz, it does not however contain metal throughout even the short length I was able to examine it; thus in the upper part at the north corner of the well these walls enclose a white China clay only. The gangue enclosing the metal is a blueish quartz, compact but exceedingly full of joints and fissures at which the stone is colored with oxide of iron resulting from its decomposition; it is on this

account not difficult of excavation, the stone is easily broken also when first excavated, but hardens much on exposure when it becomes very tough and difficult to break.

The ore occurs variously intermingled with the quartz gangue or in large cubical crystals giving the stone a porphyritic appearance, in other parts of the vein large masses of pure ore entirely free from the gangue are able to be extracted.

After getting the level of the water in the pit sufficiently low to examine the vein, I caused the pit to be deepened about three feet and the ore from a length of six feet of the vein to be broken, picked and sorted. It yielded

9 cwt. 3 qrs.	of first sort	containing by	estimation	75 per cent.
6 ,, 0	second	do.	do.	33 ,, ,,

the result after properly dressing therefore would be per fathom 9 cwt. of ore.

The direction of the vein is nearly due north and south towards the south corner, its tendency is more towards the S. E., it has an underlie to the east apparently about 75°, but in places it is nearly vertical, the strings branching out from it incline 30° or 40° only to the horizon.

Following the direction of the vein as indicated at the well, I found on examining the surface of the rock where it became exposed about 600 yards from the pit on the north side of it, a further outcrop of the vein traceable for about 20 yards; it here consists of little more than the crystal walls varying in thickness from 1 to 3 inches; at intervals of a few feet however there occur numerous holes and which have every appearance of having been made artificially no doubt, and lead ore occurred here and these cavities have resulted from its removal.

On the south side of the pit I was not able to detect any signs of the vein in the numerous granite hillocks with which the ground is studded near the well, nor in the more elevated hills beyond.

The site near Gazerpullay at which lead ore was found is about 7 miles to the north-east of the village, it lies some considerable elevation on the range of the Nullimulla hills, and is in the midst

of a very thick bamboo jungle which appears to cover the whole of these hills; the spot is marked on the Ordnance map of the district as a lead mine, and must at one time, have been one of some importance as there are now still existing the remains of what may be considered for native undertakings very extensive workings.

These consist of a number of pits varying in depth from 10 to 25 feet with galleries now fallen in, but which no doubt connected the pits and had extensive ramifications, more than 100 of these pits were counted, the working pits were confined to a comparatively small area, but numerous trials had evidently been made at some distance from the main seat of operations.

The ground in which these pits are sunk is for a few feet immediately beneath the surface a highly crystalline sandstone, they then pass into a dry and a very firable argillaceous compound; the sandstone resting upon this dry clay, has been at this point upheaved by some force beneath it, as the beds under which it lies are shown by the various depths in the pits at which the sandstone ceases, and dry clay begins to dip in opposite directions from it along a line having a direction somewhat to the east of north, in this dry clay the galleries have been executed and no doubt the lead found.

The sandstone forming the sides of the pits has been very much loosened and broken by exposure, so that without more skilled labor than I had at command, I was unable to render any one of them sufficiently safe for a man to work in, or it would have been exceedingly desirable to have sunk a little deeper at one of them, as well as to have cleaved out some of the galleries as owing to the great quantity of debris accumulated in them, I was not successful in making out the vein of ore there is every reason to believe exists here.

The general circumstances here have some analogy with the occurrence of lead ore at the third place I shall have to describe, and which I shall allude to hereafter.

The jungle about the mine is very thick and much frequented by tigers, it was with some difficulty that coolies could be obtained to proceed to the place at all! water is procurable about one

to two miles from the mine, but it has the reputation of being liable to give fever. All for the use of the coolies had therefore to be carried from Gazerpullay or Buswapoor the nearest village.

The jungle contains some fine teak timber, a material well adapted for the requirements of mining operations in supporting the sides of shafts and roofs of headings.

The situation of the mine on an elevated spot is favorable to the execution of works for drainage, so that some depth might be reached without the necessity of any arrangements for the pumping out of any water encountered during progress.

The rock is loose and easy of excavation, so that although there exists some inconvenience as to situation in being in the heart of so thick a jungle, there are many assistances towards the execution of mining works at this spot.

A small trial shaft here would soon prove if the spot that has been formerly worked by the Natives is the actual site of the vein, the aid of a party of Sappers would be requisite for the purpose as it would be quite unsafe to set ordinary coolies to excavate in a position requiring careful attention in timbering shaft or galleries to prevent their falling in.

The lead ore that has been lately found here, appears to be the debris of a mineral vein existing somewhere in the locality and deposited in its present position by the action of water, it occurs on the hill side and within a few yards of the pits above mentioned, and upon digging down it is found intermingled with fragments of the rock of the country and ceases as soon as one reaches the solid rock in position.

The ore is enclosed in a gangue of sulphate of baryta or heavy spar also occasionally in white quartz, it is as at Coilcontlah a sulphuret of lead or galena, and there are here as at that place occasionally small admixtures of copper (sulphuret) zinc, blende and iron pyrites.

The third locality for this mineral is near Nundeallumpett in the Dhoor Talook of Cuddapah.

The mineral here occurs at three points extending over a length

of four miles, viz., at the village of Buswapoor on the west side of the ghaut, on the top of the Jungumrauzpullay pass, and near the village of Jungumrauzpullay on the east side of the ghaut; at all these places there is a marked uniformity in the character of the rock in which the ore occurs, being in fact one vein or lode extending for this distance.

The direction of the lode at the several places of occurrence corresponds with the general direction passing through the three points, and is a few degrees east of north.

The lode appears to be of very considerable width, northward from Buswapoor it divides into two branches, it is possible that two veins may exist at Buswapoor, but it is not observable on the surface.

The rock of the country is a clay slate passing frequently into a quartzose schist; it dips to the E. or E. N. E. at about 40° to the horizon occasionally much more inclined, the strike of the slate being N. N. W. and S. S. E. with which direction the lode nearly conforms.

The lode is composed of a very hard and compact quartz rock of a dark grey colour; through this the lead is disseminated in minute grains; this however is its character at 10 or 12 feet from the surface; more immediately on the surface the rock has somewhat the character of a very coarse breccia composed of fragments of a porous argillaceous stone and of the grey quartzite cemented together with the siliceous matter.

The whole body of the vein at the surface has a coarse cellular structure with large cavities running irregularly through it; lining these cavities lead ore is found and at Buswapoor seems is the only part of the vein that the Natives have searched for it; this substance although differing in composition and appearance is the "Gosson" of Cornish miners and, its marked character here as with them is of great service in enabling one to trace out the course of a mineral vein; fragments found in the soil at the surface being a sure sign that the vein is not far off.

The dry pulverulent clay I have mentioned as occurring immediately beneath the sandstone at the lead pits near Gazerpullay,

has some resemblance to the argillaceous breccia, the out crop of the vein at Jungumrauzpullay and places contiguous which substance in a state of decomposition it appeared to me; its being overlaid by the beds of sandstone which have been affected by it instead of bursting through these rocks to the surface is rather against the presumption of its being a mineral vein, were it not that a similar example is seen near Nundiallumpett at which place the vein becomes suddenly concealed by the clay slate through which it has elsewere penetrated, this appears to occur at several places along the line of this vein, its existence beneath the slate was proved by slight excavations.

At Buswapoor the earth is cleared out of the cavities of this surface rock by the Natives and lead detached from their sides; occasionally they seem to have broken away a little of the rock where two cavities have been worked near to one another, beyond this their efforts have not extended.

On the Jungumrauzpillay pass it is far otherwise; here appear to have been executed some extensive workings.

They consist of a number of pits, many of the depth of 20 or 25 feet; from the bottom of these horizontal and inclined headings or galleries have been carried in various directions following the indications of the mineral.

These galleries in some cases extend 50 and 60 yards uniting one or more of them; all the excavations seem to have been effected by firing the rock, a labour which in pits so close and confined must have been very trying even to Natives as well as tedious and costly.

The indications of lead in these workings are very scanty, there are, however, many places in the present exposed surface of the rock where traces can be observed.

The vein has the same structure at the surface as at Buswapoor, and like it is similarly compounded; these characters are also distinctly marked at a third place where the vein crops out on the east side of the ghaut close to the village of Jungumrauzpillay, here ore is seen in the rock but very minute portions.

One or two insignificant pits have also here been sunk at this place.

In the opposite direction or south of Buswapoor about a mile from it there are indications of the vein in pieces of lead that have been found in the debris at the surface, I observed also many lumps of the argillaceous breccia scattered about. I did not, however, succeed in meeting with the out crop of the vein itself.

Observing, however, the uniform course of the vein, I directed my search further to the south in a range of high hills named Lunkamulla.

It was not however till some time after my departure from Nundiallumpett when I had established my camp during my operations in this locality that I received intelligence from a Goomaster acting under my instructions of his success together with the samples of the ore ; I had not therefore an opportunity of inspecting personally this spot.

Upon examining these samples of ore, I found a very large admixture of copper with the galena ; galena is usually associated with copper but tne abundance of the latter material in these samples lead to the inference that the vein on being worked would attain an importance on account of the copper.

From the investigations I have made and above detailed, it would appear that in the districts in which they have been prosecuted, there exist a series of mineral veins the individual examples as yet discovered being of some extent, and having a uniform direction of north and south and that analagous to the great Cornish mining district of England there are here also a series of non-metalliferous veins or dykes running through the country and crossing the former nearly at right angles to them, the directions here, however, being the converse of those of Cornwall, where the metal yielding veins are east and west, the unproductive or cross courses north and south; as it is not usual for mineral veins to occur in isolated examples in a district it is fairly to be presumed that here others accompany those now discovered.

In respect to the profitable working of the veins now known ; every thing would depend upon their productiveness in ore in

working, and although I have above stated an amount I extracted from a defined length, no conclusions are to be drawn from it of any future yield.

The chief value to be attached to them must of course be on the large percentage of silver which has been shown to exist in parts of the vein; as regards the value of the lead, it is not probable that however productive in the crude ore a mine in either of the places named might prove, the mineral could be profitably worked for this metal only as an article for commercial export for the requirements of the country, however, the present market price of pig lead in Madras, viz., £29-10 (average) per ton offers an ample margin for profitable working to meet these demands if not too limited in amount.

As the Government for Military purposes are large consumers of this material, it would appear to me very desirable that some small works partaking of the nature of exploring operations, but at the same time with the view of supplying their Arsenals, &c., with lead were to be undertaken by the Government, by these means more satisfactory evidence would be obtained upon which to establish works on a larger scale either by the Government on its own account or by any party of adventurers who might think favorably of the circumstances.

I am informed by the Inspector General of Ordnance and Magazines that 100 tons of lead are annually required for the use of the Army.

In hard ground it is estimated that a vein of lead having width of 3 to 4 inches, or that proportion of ore disseminated can be profitably worked: a heading or gallery five feet in height along such a vein would yield 4,000 lbs. of ore, or somewhat above one ton of metal when reduced for every six feet in length, 200 yards therefore of such a heading, would give 100 tons of metallic lead.

It would be desirable to sink a small shaft at the bottom of which such a heading could be executed; at Coilcontlah arrangements for pumping out the water would be requisite, with two sets of the pumps in use in the Department Public Works, a depth of about 20 yards from the surface might be reached.

It was my intention to have arranged for exploring operations of this nature at Coilcontlah in my late survey; but I was unable to do so without personally superintending such which would have prevented my giving the requisite attention to the other places I required to inspect.

With respect to the establishment of mineral mining in this country, the absence of any class of skilled labor at all approximating to that of the miner must offer a serious drawback with any parties who might on all other considerations think favourably of the circumstances for mining adventures in Southern India.

The preliminary exploring operations undertaken by Government whilst giving some more sure grounds for the establishment of works on an efficient scale would be the commencement of giving a few men some experience in the mechanical part at least of the work.

In the further operation of dealing with the mineral after extraction from the mine consisting of picking, dressing and washing and chiefly of much detail manipulation performed by women and children; the cheap labor of this country would be much in its favour; also as to the smelting and subsequent parting of the silver there are no points from which any difficulty incidental to this country is to be expected; the establishment for such operations would require to be fixed in some central position to draw supplies of ore from the various points, and at the same the supply of timber for fuel; the amount of fuel required for reduction of the ore being 10 to 15 cwt. for each ton of lead reduced.

Iron making at Roodrar.

The country which may be described under the name of the Roodrar Iron district extends for about 25 miles north of this place; Iron making seems to have been carried on in former times at nearly all the villages immediately skirting the eastern side of the Nullemulla hills.

The following are the names of a few of the places where fur-

naces were in blast or only recently stopped, from local causes at the time of my visit.

Sultanpett.	Roodrar.
Varsapoor.	Kumbulnoor.
Serinapoor.	Madaypoor.
Kuddamal Callwa.	Gallchinpollium.

The ore and fuel are drawn from the neighbouring hills where both exist in considerable quantities, the jungle at each place in these hills that I visited being most dense.

The ore throughout appears to be of one uniform variety, viz., the specular ore often micaceous; it is mostly obtained from near the highest ridge of the ghaut and very far into the jungle, the Natives dig only a few feet below the surface for it, preferring to seek a new spot when the ore becomes compact and difficult to extract; this he is readily enabled to do from the extent it seems distributed.

The best qualities obtained are the rolled stones dug out of the surface soil as in the action by which they have been deposited, they have experienced a sorting in proportion to their specific gravity and are easily gathered.

These rolled fragments appear to exist in greater or less amount over the whole of the eastern side of the hills above Roodrar.

Amongst these hills furnaces are worked during the hot season, the workmen remaining in the jungle during this time and proceeding to the village during the wet weather.

The Bhoy or Hunter caste are the only men that engage in the jungle work.

The ore "in situ" exists in a vein traversing clay, slate and schistose sandstone, which forms the general character of these hills on their eastern side from Cuddapah to the Nundicunnama ghaut.

The ore is brought to the furnace on the backs of buffalos, the charcoal by the coolies engaged in cutting and burning it; the furnace is of the form which appears to be universally copied in the various Iron districts of India, and is described in the reports of the Madras Museum.

The ore is first worked up into rough balls which are cut in two pieces, each piece separately reheated, forged and subsequently welded up into bars of any required size.

1 Buffalo load ore..........	75 lbs.	Yield one
3 Cooly „ charcoal...	108 „	split ball.

this is subsequently worked up into a bar of the weight of 10 to 13 lbs.; 5 to 6 being so worked up in a day by the expenditure of 3 cavady loads of bamboo charcoal:—5 men are engaged at the furnace, 2 of whom work the bellows, being relieved at intervals.

Four balls are produced in the ordinary course of things per diem from one furnace.

The merchant pays by advances, &c., to five men who go to the jungle to dig the ore and afterwards work the furnaces; to each man, per mensem Rs. 4, in which time they must deliver him 96 balls.

The coalmen for cutting, burning and delivering the coal for each lot of 4 balls receive one Rupee.

For working up these balls or blooms into bars.

	As.	P.
One Smith at per diem..................	6	0
Four Hammermen each at...............	2	8

these men work up eleven ½ blooms into merchant bars in the day.

In addition to the above the merchant makes annual presents of:

Rs. 20 to the charcoal burners.

Rs. 6 to the furnace men,

he calculates on receiving 4 to 500 blooms in the season.

His outlay for each lot of 96 blooms will be:

Furnace men............	Rs.	20
Charcoal................	„	24
Forgemen...............	„	10
Coal consumed by ditto...	„	1
Annual presents..........	„	3
		58
Interest and Contingencies at 25 per cent..		14½
Total Rupees..		72½

Produce 96 bars selling on the average at Rs. 1 each, Rs. 96.

Notwithstanding the enormous waste both in material and labor consumed, and the high price of the Iron resulting about £20 per ton, the manufacture is carried on both with advantage to the district as well as considerable profit to the merchant supplying the capital, it becomes desirable therefore to consider if some improvement could not be effected in the details of the operation, under the existing system.

The great disadvantage under which the native works, is evidently the inefficient means he has of producing the blast, on this account his furnace is so small in size, and the expenditure of fuel so large.

Near Roodrar in the jungle where I have mentioned that the furnaces are worked during the dry season, there appears to be a good position for the construction of a tank, the water of which might be employed as a source of power, for supplying the blast to a number of these small native furnaces.

The drainage area of supply to this tank is about 16 square miles, this with the average rain fall of 27 inches would, if collected, give $1\frac{1}{2}$ horse power throughout the year for every foot of fall for which the water could be made available.

The valley in the lower part has a fall about 20 feet per mile, and at about 3 miles above the lowest part the tank could be constructed.

At three places therefore there could be established furnaces with water power of 30 horse at each.

With this power not only could an efficient blast be supplied for 50 of these native furnaces, but rolling and shingling mills for working up the blooms for the whole of the furnaces could be wrought at each of the three places along this valley.

Labor in the Roodrar district for Iron making being confined to a particular caste of men is very limited in amount; by the assistance of water power, instead of taking 5 men to each furnace, 2 men could attend at least 3 furnaces for charging and drawing them, the men thus released would engage themselves in collecting ore and fuel.

The consumption of ore and fuel might safely be reckoned upon

being reduced with an efficient blast, the former by one-half and the latter two-thirds the present amount.

It would not be requisite, neither do I think the ground offers the facility to collect the whole of the 16 miles of drainage into one tank at the best site in reference to elevation; a number of small tanks would enable the furnaces to be established to a greater advantage in reference to obtaining supplies, one of these tanks being first established would, at a small expense, be able practically to prove the value of the proposal.

The most ready way of commencing would perhaps be for the Government to take a certain rental for each furnace supplied with air, the renters paying the hire of a native mechanic to attend to the water wheel, &c., its repairs.

The establishment of Government works would, however, I think ultimately prove desirable not only for supplying their own Arsenals, &c., with iron, but also for aiding the introduction of those improvements in the native system which I apprehended must suggest themselves after the application of power to it.

These will consist in the use of fluxes, increase in the size of the furnaces, and eventually in the manufacture of cast iron, of which material many articles in use in the country could be made equally serviceable and at a much cheaper rate.

As Schools of Industrial Art works of the above nature connected with the other branches of skilled labor required for Ordnance and other Government uses, partaking of the character of the Mint, Gun-Carriage Manufactory and similar institutions in operation at the Presidency must greatly tend to the improvement and promote the well being of the natives of this country, if only reasonable grounds can be shown for such establishment being of practical service to and not a burden upon the Government.

That there is a great increasing demand for native iron is shewn by the enormous advance upon its selling price that has gradually taken place during the last twelve months, I am informed that at this place, Bangalore, this has been from Rs. 1½ to Rs. 2½ per maund, the present price.

Native iron must always command a high price in this country,

and for the generality of purposes foreign iron cannot be substituted for it.

In the hands of the Native smith European iron is worked with difficulty, it gets burnt, made brittle and rendered useless, the high price Native Iron commands in the Mofussil in comparison with it, viz., £23 per ton, to £16 at which European iron can be purchased is sufficient evidence of its value.

With respect to the cost of establishing an initial work as proposed near Roodra, I have estimated that a tank having a length of bund of 800 yards and extreme height of 5 yards could be constructed to retain $1\frac{1}{2}$ million cubic yards of water, together with a contour mill channel of $1\frac{1}{2}$ mile in length for an amount Rs. 2,500, a water wheel and fan for a similar amount, if made on the spot, add Rs. 1,000, for contingencies,—Total Rupees 6,000.

The above body of water falling through a height of 20 feet would give during three months of the year for 72 hours of each week an available power of 20 horse.

The saving upon each furnace supplied with air, would be

4 men at Rs. 4 each per mensem or for a season of 3 months Rs. 48.

An annual charge of Rs. 30 on each furnance would require only 20 to be concentrated at this spot (instead of as at present scattered amongst the neighbouring villages) in order to yield a return of 10 per cent. on the outlay above estimated.

SELECTIONS.

Official Reports on the last Journeys and the Death of ADOLPHE SCHLAGINTWEIT *in Turkistán, Collected &c. &c.*

BY HERMANN AND ROBERT SCHLAGINTWEIT.

INTRODUCTION.

IN the following pages we propose to communicate, in a collected form, the various reports which have reached us relative to the last journeys and the melancholy fate of our beloved brother Adolphe Schlagintweit.

The information from India and Russia, collected from Natives by European Officers of the adjoining districts, concur but too accurately in establishing the fact, that Adolphe Schlagintweit was killed at Káshgar in Turkistán (Central Asia) in August 1857, falling a victim to his scientific mission.

He was recognized as a European after having passed the Kara-korùm and Küenlüen, in disguise, where before us no European had ever travelled; he had taken a route more westerly than ours and had succeeded in penetrating far into Central Asia.

The reports which have reached us are so various, that they do not of course all agree; as to the immediate cause and particulars of his death; yet it is evident from all of them, that the political condition of these countries, and the circumstance of the deceased's being recognized as an officer of the Indian Government, notwithstanding every precaution, essentially contributed to his tragic end. Even with the lively sympathy ever so energetically evinced by England, in the fate of Scientific Travellers, it will scarcely be possible to succeed in bringing the murderers of our brother to account.

According to some reports he perished in consequence of having taken up the cause of some captive Bhot-Rajpúts, British subjects, interceding for them, that they might not be executed or sold as slaves. Other accounts state the immediate cause of his death was, his having been recognized as a European, and fallen by the hand of fanatic Mussalmáns.

Notwithstanding our most zealous exertions for some months past, in endeavouring to obtain his manuscripts, drawings, etc., we have not yet been successful in learning anything definite about them; still however, many very important geographical communications have been made to us by his followers, and we are not without hope that from the active sympathy which the Indian Government has always displayed in our Scientific Mission to India and High-Asia, nothing will remain untried that can tend to the rescue of his last papers.

We owe the subjoined reports respecting the last fate of Adolphe to the kindness of the following gentlemen:

I. Captain Henry Strachey, 66th Gòrkhas, of Almòra (Himálaya) who, in consequence of his scientific journeys in the Himálayas, and in western Tíbet, was in a position to select the persons on whose reports the most reliance could be placed and who also was particularly enabled, critically to elucidate these reports.

II. G. Knox, Esq., Assistant Commissioner of Kúlu (Himálaya) who in an unexpected manner found an opportunity of making inquiries of the Yarkándi Káttah-Ali-Shah at Nágger, a place so distant from Yarkánd.

III. M. Vardouguine, Russian Consul at Chúguchak (Central Asia) whose report we have received through the kind offices of Baron Budberg at Berlin.

Notwithstanding the enormous distance, we have received these reports in a remarkably short time, through the active sympathy of Prince Gortschakoff.

IV. Lieut. Col. Edwardes, C. B., in whom Adolphe already, when at Pesháur, had found a warm friend, and who, making use of his important political position, has recently with the greatest energy and kindness made every exertion to obtain the latest definite information relative to our ill-fated brother.

In addition to the above, we had repeatedly received general accounts on Adolphe, with expressions of the most cordial sympathy, through the Indian Press, and private communications from the following gentlemen :

The Rev. H. Jäschke, Missionary at Lahól (Himálaya).

A. C. Gumpert, Esq., Consul for Hamburg and Oldenburg at Bombay, and F. Schiller, Esq., Austrian Consul at Calcutta.

Lord Elphinstone, Lord W. Hay, Major Ramsay, the Hon. W. Elliot, L. Bowring, Esq., Private Secretary to Lord Canning, W. Russel, Esq., correspondent of the "Times" during the Indian rebellion, and others.

Notices in their letters which were not included in the Official Reports, have been added either as notes, or in brackets, [], in the text. Our own observations upon the individual Natives furnishing the reports, as well as remarks upon several geographical points, are also given in brackets.

We have further to acknowledge the important assistance we have received in collecting information respecting our deceased brother from Lord Stanley, Col. Sykes, and Sir Roderick Murchison, in England, and from our venerable and most kind friend Baron Humboldt.

I. *Reports collected and Communicated.* By CAPT. HENRY STRACHEY.

1. Verbal Statement of the Native Doctor Hárkíshen*, Almóra August 1858.

Adolphe Schlagintweit crossed the Bára-Lácha Pass from Dárche in Lahol into Rúpchu of Ladák, i. e. from India to Tíbet on the 31st of May 1857 taking with him :

1. Mohámmad Amín, Native of Yárkand, chief Guide,†
2. Yahúdi, Guide to No. 1,
3. Mohámmad Hássan, of Pesháur, Munshi,
4. Abdul, of Kashmir, } Domestic Servants etc.
5. Ghost Mohámmad, of Muradabád, } Domestic Servants etc.
6. Múrli, of Bhágsu in Kangra, } Chaprássi's,
7. Máula Baksh, of Muradabád, and others. } Chaprássi's,

The 1st of these, Mohámmed Amín, was a person of questionable antecedents, nominally a merchant, trading between Yárkand and Leh but said also to have acted in the capacity of a gang-robber on the road between those places.

Being at Leh, in 1856 he was arrested by the Dógra Thanadár Bâsti Ram for debt in the suit of sundry merchants, or for other reasons, and released on the application of Hermann and Robert Schlagintweit, who engaged him to act as guide for their journey

* Dr. Harkíshen, a Bráhman now employed at the hospital at Almóra, is a Native Doctor; he was, alternating with others, attached to our establishments during 2 years, travelling now with the one, then with the other of us three. He also was very useful to us as observer on stations for corresponding observations.

† Remarks on the the transcription of Indian names :

Vowels and diphthongs as in Italian and German. ˘ over *a* and *e* (ă and ĕ) denote an imperfectly formed *a* and *e* as the English *u* in but, and *e* before *r* in herd. Diphthongs are meant to sound like the 2 component vowels combined. Consonants generally as in English ; but *h* after a consonant, also after *t* is an aspiration except in *sh* which has its usual sound.—The ' marks the syllable to be accented.

towards Khótan in the summer of that year (the account of which is on record). [Vide the Report No. VIII of the Officers engaged in the Magnetic Survey of India, Agra, Secundra Orphan Press 1857.] On their return to India in the autumn he was discharged and remained at Leh, where he soon got into trouble again with the Dógra Government.

Some say that the Agents of the Chinese Government in Yárkand having heard of his bringing European travellers across their frontier (which is high treason in their Code) offered a reward of 1000 Rupees for his apprehension, and perhaps coerced some of the Kashmíri residents at Yárkand to work upon their friends in Ladák and Kashmír for the same object, which Gulab Singh and Básti Ram possibly also turned to a mercantile transaction.

However this may be Guláb Singh having ordered his arrest and threatened to hang him soon after the Schlagintweit's (H. and R.) departure, he fled from Ladák into Kúlu, where Adolphe S. found him, at Sultanpur, in April 1857.

There had possibly been some previous arrangement between them: Any way A. S. again entertained him as interpreter, guide, and baggage master for another journey into Turkistán.

As a specimen of his veracity, it may be mentioned that he informed Harkíshen that he was to have a monthly salary of 2,000 Rupees whilst travelling with A. S., and a monthly pension of 1,000 Rupees after he had brought him back safe to India. Major Hay Assist. Commiss. of Kúlu probably knows more of Mohámmad Amín's history.

[Mohâmmad Amín, an aged Turkistáni, has rendered us during our expedition to Turkistán most devoted and important services. His manner of treating the Natives, and the cordial reception he met with everywhere, plainly showed that in his own country he was very well known and esteemed and considered as an important person. We essentially owe it to his clever behaviour with the Natives that we made it possible to advance as far as we did.

It may be, that he later named to Adolphe's establishment an exaggerated sum for his pay, perhaps for appearing as a more important person.

Whilst he was with us, all our money transactions, sometimes to a pretty great amount passed through his hands, and we never had the least cause to complain of him.

No. 2. Name not known to Deponent (Harkíshen) [We know this man personally; his name is Murâd; he is a native of Bokhâra. We saw him first in Ladák, after our return from Turkistán; he at this time has given us much valuable information about routes in Central Asia and we always have found him a very trustworthy, respectable native]. He was commonly called "Yahúdi," *i.e.* "the Jew," was a native of Yárkand and dependent of Mohâmmad Amín: they had some baggage ponies with them, and 4 Turkish grooms or baggagemen, all of which were engaged by A. S. for the journey.

No. 3. Mohâmmad Hâssan of Pesháur was engaged by A. S. when he was at that place in December 1856 as a Múnshi, assisting also in scientific observations and accounts.

The last documentary evidence of A. S.'s movements written by himself is a letter to Harkíshen dated from Changchénmo in Ladák 14th June 1857, a postscript to the same, stating that it was not sent till the 24th idem; and one or two notes for sundry payments of money, of the latter date. The letter consists chiefly of instructions to Harkíshen, and of A. S. himself only says: "I am quite well and at present all things seem to go on pretty right," but as it also mentions two Dâk parcels, one for Lt. Charles Hall, (Assist. Commiss. of Bhágsu), sent by the same dispatch for transmission to Kângra, other persons have no doubt received letters from him and the particulars of his history, up to that time.

[We have received none of the letters mentioned. Also the Rev. H. Jäschke, Missionary at Lahól, who received about the same time letters from our brother, copies of which he had the kindness to send us, could not give us any other information about his later movements.]

These documents were brought from Ladâk by the Chaprássis Múrli and Máula Baksh (No. 6 and 7 of the above list) who joined Harkíshen at Kárdong in Lahól on the 20th of July 1857.

It appeared from the statement of these men (made to Harkís-

hen) that before they left A. S. the Múnshi Mohámmad Hássan had deserted, taking with him one of his master's (or Mohámmad Amín's) poneys, some little money, and other articles belonging to A. S. The Chaprássi's were directed to overtake him if they could, recover the property and make it over to Harkíshen in Kúlu: which they succeeded in doing, but leaving the Múnshi himself in Ladák, whence he probably made his way to Kashmír and Pesháur. He gave them a letter for his master, which they brought to Harkíshen, and is still extant among his papers, written in pencil in broken English, excusing his sudden departure on the score of inability to endure the hardship of such a journey any longer, and admitting a balance of 72 Rs., of which he gave the Chaprâssi's his accounts but did not pay the money.

It must be observed that A. S. makes no allusion to all this in his letter to Harkíshen; from which it may perhaps be inferred that he did not attach much importance to the Múnshi's desertion.

Harkíshen when at Déra in November 1857 gathered from Capt. Montgomery of the trigonometrical survey and his Native doctor, that they had been in Ladák during the past summer, and that A. S. had left Leh* before their arrival there, and that they knew nothing more of him.

From the locality of his last dispatch, Changchénmo (which may be seen in my map at the N. E. end of Ladâk), I infer that he crossed the Turkish water shed to the east of the Karakorùm Pass, properly speaking perhaps to Súget, thence following approximatively the route taken by his brothers the year before, towards Kílian and Khótan.

It appears that he had laid in a stock of merchandize in India, with the view of facilitating his journey by trade or the appearance of it.

[We also had with us instead of money, chiefly merchandize, rich Indian cloth, silks, etc.]

2. *Statement made by Bhútias from Johàr Almôra, August* 1858.

From the Bhútias of Johâr who got their information from Kash-

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* Adolphe had not been in Leh during this journey.

míris of Ladák at the Gârtok fair in the Autumn of 1857, I heard that Adolphe Schlagintweit had succeeded in reaching the margin of the inhabited country at the foot of the Mountains [north of the Küenlüen]. There he went out from his camp some way to reconnoitre, and in his absence the guide Mohâmmad Hâssan absconded, with most of the baggage and cattle*, towards Yárkand. Adolphe Schlagintweit being left helpless, sent back some of the Ladâki baggagemen he had brought with him with a letter or message to the Thanadâr of Leh requesting him to send assistance in men, cattle, provisions and money; whether for the purpose of continuing his attempt to penetrate into Turkistán or merely to return to Ladák with less hardship, does not appear.

When his messengers arrived at Leh they found Básti Ram's son in authority there; the Thanadàr himself being away in Kashmír. The son is said to have refused the required assistance: more likely, in fact, he was too silly and timid to act upon his own responsibility, and referred for instructions to his father or Gulâb Singh in Kashmír, at the expense of great delay and danger to Adolphe Schlagintweit.

3. *Information contained in the Delhi Gazette and general remarks of Capt. Strachey. Summer* 1858.

The following accounts are derived from letters which have been published during the summer 1858 in the *Delhi Gazette*, from a correspondent of that paper apparently at Simla, and deriving his information from merchant travellers from Ladák.

From these it may be gathered that Adolphe Schlagintweit, passed the winter of 1857-58 at the foot of the mountains [of the Küenlüen] on the border of Khótan, on this side of the Chinese outposts; among the same tribe of shepherds, perhaps who gave his brothers a friendly reception the year before. On his arrival there the provinces of Káshgar and Yárkand were in a very disturbed state, from one of those invasions of the Turks from Kó-

* Besides the animals of burden: horses and yaks, travellers in these regions are always obliged to take with them a living stock of sheep, goats, etc. for their support. Yak is the name of the Tibetan Ox=Bos gruniens.

kand which have been recurring periodically every 10 or 20 years during the past century.

On these occasions the foreign invaders being joined by the Turks of the country, usually succeed in driving the Chinese Garrisons into their forts and subverting the celestial government for a time, till reinforcements come from the Chinese Provinces further east, when the rabble of Turks soon becomes disorganized, the Kokándis retire to their own country and the people of Yárkand and Káshgar are left to settle their own accounts with the Chinese, which is sometime done by wholesale massacres of the Turks of those cities.

The invaders are commonly headed by one of the Khójahs of Andishán of the family which ruled at Káshgar before the Chinese conquest (about 100 years ago), and who still aspire to the recovery of their former dominions.

An unsuccessful invasion and rebellion of the Turks as here described occurred when I was (Capt. H. Strachey) in Ladák in 1847-48; on the present occasion the result is said to have been the same.

So long as the Chinese were in the ascendant, Adolphe Schlagintweit would have had little chance of penetrating the inhabited country to so great a distance: they have outposts on all the roads across their frontier; from the rarity of population and traffic, individuals are easily marked; and Adolphe Schlagintweit would hardly be able to barbarize himself enough to bear scrutiny.

An European traveller attempting to pass any of these outposts would probably be stopped and turned back, and extra precautions taken against him all along the frontier, but if detected after penetrating the inhabited country to any distance he would more probably be murdered.

The English and Kokándis are generally speaking in no hostile relations, and from his own successful antecedents in Yárkand, Adolphe Schlagintweit might possibly meet a friendly reception there. On the other hand, the Kokándis are (as usual with the Turks of his country) on bad terms with all their neighbours, including the Russians, who are steadily encroaching on their North-

West frontier; this would add to his difficulties in leaving their country again.

4. *Report from Màni and Nàin Singh. Almóra, Jan.* 1859.

[Máni and Náin Singh, Bhot-Rajpúts from the highest valleys of the Himálaya have been during 2 summers in our service; Máni also went with us to Turkistán, whilst Náin Singh (with the native doctor Harkíshen) remained at the magnetic observatory at Leh. We always found them most faithful servants; they also were of great assistance to us by their knowledge of the Tibetan and by their clever and prudent behaviour towards the Natives.]

Máni and Náin Singh from Mílum in Johár, left Adolphe Schlagintweit at Pesháur in January 1857, and returned to their own country during the next three months making a few observations by the way, after this they had no further communication with Adolphe Schlagintweit, excepting only by a message sent in March 1857 through Captain H. Strachey, 66th Górkhas, which requested Máni to join Adolphe Schlagintweit again either at Kángra in April or later in Ladák, which however Máni did not attempt.

Going as usual to the Gártok fair in the summer of 1857, Máni heard only some vague reports about Adolphe Schlagintweit from traders from Ladák, the substance of which *is* already given.

In December 1857, Máni received a packet of a hypsometer, thermometers and other instruments with notes from Herman Schlagintweit through Mr. B. Colvin, Assistant Commissioner of Kamáon. These had been sent from Calcutta in April of that year but owing to the disturbed state of affairs in Upper India soon after, and Máni's absence in Tíbet, their delivery was delayed till his return to Johár at the end of the year. He made little or no use of these instruments, and ultimately returned them to me (Captain Strachey).

In September 1858, Máni being again at the Gártok fair, got some further information about Adolphe Schlagintweit chiefly from Núrpur, a native of Súnam in Kanáur, trading to Ladák and Yárkand. This person was himself at Yarkand in 1857. When Adolphe Schlagintweit arrived in that quarter, the Turks of Kókand were already at or near the city. Adolphe Schlagintweit

himself did not enter the town but his chief guide Mohámmad Amín* did so and left it again either before or during the siege, under what relations with his own master or with the insurgent Turks was not known to informant.

As the siege continued and the Chinese were shut up in their citadel, they obliged the inhabitants of the place to take part in the fighting among others a lot of foreign merchants including about forty-five (45) of the Bisséris of whom fifteen (15) only returned, informant Núrpur being one of them ; the rest were either killed or made prisoners by the Turks.

After the siege was raised, informant heard that Adolphe Schlagintweit had joined the camp of the Turks, and been at first well received by them ; on their retreat towards Kókand, he accompanied them as far as Káshgar. As the hordes of Turks were carrying off with them a lot of their prisoners to be kept or sold for slaves (according to their custom) some of the Bisséris† being among the number, Adolphe Schlagintweit tried to assist them, remonstrated that they were British subjects and should be released. On this arose a dispute ; the Turks accused Adolphe Schlagintweit of taking part with their enemies and ended by killing him.

Máni also said that Núrpur had certificates from the Chinese authorities of Yárkand, testifying his services in the siege, and promising him some reward at a future opportunity.

The above account of the Bisséri Nurpur was confirmed by 'Omar an 'Argon‡ of Ladák who had received letters from his friends at Yárkand to the same effect.

II. *Information received from* G. Knox, Esq., *Assistant Commissioner of Kúlu.*

5. *Verbal Statement of Kattah Ali Shah from Yárkand. Nagger in Kúlu,* 28*th September* 1858.

Last year in the month of Sévan (July 1857) viz. 14 months ago,

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* According to the more probable information by 'Abdul communicated later, it was not Mohámmad Amín, but Murád, who entered the city to get information.

† In whose country we had been much travelling about.

‡ Argon is the name of the mixed races of Yarkándis and Ladákis.

the Andishánis* came to Yarkand to fight with the Chinese, and I went to Kárgalik, two days' journey south of Yárkand. The Andishánis took me and all the Panjábis, Kabulis, Kashmíris and Hindostánis, in all some 40 or 50 persons, prisoners; at that time two Andishânis and a Múnshi were accompanying a Sahib who was coming from the Ladák side; these three men ran away with the Sáhib's property and came to Kárgalik; there they stopped in the house of one Kurbán and they said to him, we have some property for sale, do you take it? When we had sent for the property and examined it, he found it to consist of 12 or 14 yards of valuable embroidered cloth, a number of ordinary cloth and some other property also, but I did not see it with my own eyes. Kurbán having seen the things, went and reported the fact to Háji Mísser, Kardár of the Andishánis, saying that these men were poor and had nothing of their own, and that they must have robbed this from somebody. Háji Mísser sent for them and intimidated them, questioning as to where they got the property and whose it was.

They at first asserted the property was their own, but when threatened severely, they stated that Mohámmad Amín had brought a (Feringhi),† and that they had stolen these articles and were escaping with them. Háji Mísser asked where the Feringhi was, they replied: "God knows, he was on his way to Yárkand; if he has gone there he will have arrived at the village of Kílian." Háji Mísser therefore sent 2 or 3 of his own men, and told them to go and fetch the Sáhib, they therefore went to Kílian and brought the Sáhib from thence to Kárgalik, and Mohámmad Amín was also with them.

[It may be surprising that it was not Mohámmad Amín they should have selected as interpreter at the following interview. But we only could speak ourselves through interpreters with Mohámmad Amín; he knows besides his Native language, the Turkish, only a little of the Tibetan and rather more of the Persian language, but no Hindostáni whatever. Our Interpreter, whilst travelling with him in Turkistán, was Makshút, a Native of India,

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* Andishán is a large town, situated east of Kókand.

† Feringhi is in India and Central Asia the general designation of an European, the word being a modification of Franc.

now settled in Ladák as landed proprietor, who knows very well Turkish, Persian, besides Hindostani and Tibetan; our chief Tibetan Interpreter was Máni. Both Makshút and Máni, had formerly been travelling with the Stracheys in their expeditions to Tibet; Makshut, now a pretty aged man, was also at one time the companion of Moorcroft. Our brother's Interpreter seems to have been the run away Múnshi; also Abdúllah is missing here.]

Nobody understood the Sáhibs speech in the country, they searched therefore for somebody who could understand him, in hope of finding some one who could understand Hindostáni or Panjábi. I was in confinement and they took me to the place. Háji Mísser told me to ask the Sáhib why he had come there. I asked the Sáhib, he replied that there was Shazádah, son of Mohámmad Shah, living in the Andishán country, and he had visited him (Mr, Schlagintweit in Lahór and said "do you come to Andishán, Sáhib and I will establish friendly relations between the Naváb of Andishán and the Sáhibs, that it was on this account that he was on his way to Andishán." Háji Mísser confiscated all the Sáhib's property and put the Sáhib in confinement, and sent him to Zúllah Khan, a principal Sirdár. When they put the Sáhib in confinement he said to me: "no one here understands my language, and my belief is, that these people will kill me, should you go to that side of the country, by Kúlu, tell this matter to Hay Sáhib; if you go by Kashmír tell it to whatever Sáhib you meet." After this the Sáhib went away. On the day that the Sáhib went to Sirdár Zúlluh Khan, on the same day the Chinese force came to fight with the Andishánis, and the Andishánis fought for half an hour and then ran away and took the Sáhib with them. When the Chinese force came all the Andishán Kardárs ran away, and we forty or fifty men who were in confinement got free. I afterwards heard the Dil Khan, the great chief of the Andishánis had taken the Sáhib's property and put him to death, but I only heard this from the report of travellers of Kásgar and Yárkand, I did not see it with my own eyes.

Question: Do you know any thing of the property of the Sáhib or his servants?

Answer: No, I do not know any thing about them. I only saw

the Sáhib and Mohámmad Amín Móghul*), some also said that Mohammad Amín had been killed, others that he was alive, others that he had his nose and ears cut off.

III. *Information received from the "Department Asiatique" of St. Petersburgh through Baron Budberg, Russian Minister at Berlin.*

6. *Letter from Mr. Vardouguine, Russian Consul at Chúguchak. Chúguchak,*† 31*st December* 1858, (11*th January* 1859).

Although the following informations must tend to increase the general sympathy which is felt in the fate of the renowned and universally respected traveller Adolphe Schlagintweit, they unfortunately offer no consolation to his brothers.

In the autumn of 1857 at the time of the insurrection against the Chinese in Turkistán which was headed by Búzruk Khan, a nephew of Jehángir Háji, a Feringhi (European) came to Turkistán from India‡ giving himself out for a merchant.

Having received the permission of the Chinese Authorities to proceed to Káshgar, the traveller unfortunately arrived on the day when Búzruk Khan made his entrance into the town. The next day, he presented himself before the latter to obtain his permission to extend his journey into Kókand; Búzruk Khan, however takink him for a Chinese spy caused him to be murdered. It has been asserted that he declared to Búzruk Khan, before his death, that his murder should not remain unpunished as no means would be neglected to find him.

This report has occasioned a belief in the country that "this European was a person of high importance, belonging to the Feringhis who govern India," (*i. e.*, that he was an Indian officer.)

It is also asserted that the four Europeans composing his retinue§ were also murdered.

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* Mógul is the general designation of the Turks in Central Asia.

† Chúguchak, 46° 9' N. Lat. 83° 7' Long. E. from Greenwich is a Russian station south of the Záisang Lake.

‡ The name Sikemarata here given as the name of a little town, from which he is supposed to have come, must refer to the country of the Sikhs, the Panjáb. We are unacquainted with any town bearing this or a similar name.

§ This appears to be an error. He had no European attendants.

The person through whose agency I obtained these details did not know whether he was also accompanied by Mussalmáns. All the effects of this traveller are said to have been taken by Búzruk Khan, on his return to Kókand.

It is further reported that this traveller came from India intending to proceed through Tíbet to Kókand, or, in the event of being prevented from doing so, to return as he had come. His name is unknown. All that I can learn respecting him is that he was very tall [at least in comparison with the much smaller races of Central Asia.]

I obtained these statements on inquiring of the headman of a large caravan from that place whether any Europeans had fallen in the rebellion in Turkistán.

Unfortunately the statements I received especially as to the routes* agree but too well with the points to which my attention was directed as being essential ones in reference to the person into whose identity I was commissioned by the Asiatic Department in November (No. 4160) to make investigations.

7. *Second Report from Mr. Vardouguine forwarded to Baron Budberg by Mr. George Kowalewski, St. Petersburgh 2nd (14th) March* 1859.

The Prince Gortschakoff has already communicated in his despatch to your Excellency (Baron Budberg) of the 10th (22nd) of February, some information which Mr. Vardouguine, acting as our Consul at Chúguchak had forwarded to him, and which appear to have some bearing on the fate of Mr. Schlagintweit. According to a fresh report, dated 24th January (25th February,) from the same official, it would appear that this ill-fated traveller had not four, but only three companions who did not share his fate but saved themselves. Mr. Vardouguine brings forward a circumstance which, however indefinite it may seem, may still not be without weight for those who personally knew Mr. Schlagintweit, in establishing his identity. The traveller who is said to have been

* Our letters, in consequence of which Prince Gortschakoff had the kindness to institute inquiries, contained indications about the details of our brother's possible routes to Turkistán, and also about those which he might have adopted to reach the Russian territories.

killed, is described as having a mole (tâche naturelle) under his right eye.

[Our brother certainly had no such mole, but it is not impossible that some scarred wound, of which we knew nothing, might be meant.]

In communicating this information, M. le Baron, I consider it useless to observe how little credence it deserves. The inhabitants of those distant regions where they were collected, generally speaking, make no scruple of modifying their reports at pleasure, especially when Europeans are concerned.

IV. *Reports collected by Lieut. Colonel H. B. Edwardes, C. B., Commissioner and Superintendent Pesháur Division.*

8. *Letter to R. Temple, Esq., Secretary to the Chief Commissioner of the Panjáb. Pesháur* 18*th December* 1858.

POLITICAL DEPARTMENT.

I am not aware whether the Chief Commissioner has yet received a reliable account of the circumstances attending the death of the German traveller Mr. Adolphe Schlagintweit; but at any rate it will be satisfactory to Government, and his friends, to be able to compare the enclosed narratives of the sad events.

The first No. 9 is the verbal statement of a Kashmíri follower of Mr. Schlagintweit's named Abdúllah*, who arrived here viâ Bokhára and Kábul three days ago (15th December 1858).

The second No. 10 is the written report of a native of Yárkand†, named Mohámmad Amín, who appears to have been provided by Lord William Hay, as a kind of courier to Mr. Adolphe Schlagintweit. He writes from Kókand and Abdúllah is the bearer of his letter.

From these statements, which appear to me substantially, trustful, it seems that Mr. Schlagintweit was impelled by a desire to find a road to Yárkand which need not pass through Ladák;

* His full name is Abdúllah Mohámmad.

† In the official report Mohámmad Amín was called a native of Ladák, what we altered, since we knew Mohámmad Amín, who was also our chief guide in the previous during our travels in Turkistán, to be a native of Yárkand. Adolphe had however not seen him, he having left us at Leh in Ladák.

that he reached Yárkand; found that country harried by crescentaders from Kókand; and passed on to Káshgar, where the same fanatical raids were going on, and the leader of one of them, a Sáyad named Váli Khan, seized Mr. Schlagintweit and barbarously caused him to be beheaded, without any other offence apparently than that of being a foreigner.

If anything could soothe the distress of Mr. Schlagintweit's friends in Europe, it would surely be the noble contrast between the enlightened purpose and humane search for knowledge, which bore him into those wilds with his life in his open hand, and the barbarians frenzy for the propagation of error by the blood of his fellow-men.

I have sent by separate parcel a slip of paper, and a broken pocket telescope, which were the only relics Abdúllah could bring away with him.

[We have received these objects.—The handwriting on the slip of paper is sure to be that of our brother; but it is beyond all doubt that it had been written not during his travels in Turkistán; it is dated "Pesháur" and is probably written in December 1856. It seems to be a thrown away label, probably on account of being indistinctly written, belonging to an object of his ethnographical collections.

The telescope which 'Abdul says to have been bought from one of the people, who robbed our brother's property was certainly not his; it looks as if it had been purchased in a native bazar of Pesháur, and it is of so rude external appearance, that our brother cannot even have taken it with him as an object of present for natives; it only magnifies $1\frac{1}{2}$ times and gives very badly defined images.

We have communicated to Colonel Edwardes our well founded doubts that these objects should have been amongst our brother's property in Turkistán and we have requested him again to cross-examine Abdúllah, and to keep at the same time in mind the improbability of his statements, at least in reference to these objects.]

9. *Verbal statement given by the Kashmíri Abdúllah an attendant on Mr. Adolphe Schlagintweit.*

About two years ago when the Amír of Kábul came to pay a visit* to Pesháur, Mr. Adolphe Schlagintweit the surveyor was in Pesháur, and I was employed under him as a Sepoy of the guard. On the Amír's return to Kábul, Mr. Adolphe Schlagintweit went to Kohát, and thence viâ Kalabágh and Déra Ismáel Khán to Lahór, where having purchased necessary things for the journey the set out for Bhágsu (*i. e.* Dharamsála the head quarters of the Kângra District). Here he left half the Government property he had in his charge, and with the other half he went to Kúlu and Sultánpur. Here he got acquainted with Mohámmed Amín of Yárkand whom Lord William Hay had sent for the purpose.

Mohámmad Amín was obliged to go for protection to Lord William Hay to be safe from Guláb Singh's prosecution. (See Capt. Strachey's Report.)

Also the officer [named Basti Ram], who was posted to Ladák as a Thanadár by Maharája Guláb Singh†, bore very ill feelings towards Mohámmad Amín, because the latter had shown to Europeans, to the brothers of my master, the way to Yarkánd.

My master (Mr. Adolphe Schlagintweit) stopped at Sultánpur for some days with a view to arrange with Mohàmmad Amín for the journey. He then sent his baggage under the care of Mohàmmad Amín to Kóthi Kárnung, and he with myself, Doctor Harkíshen, and Gosht Mohámmad Butler went viâ Búngal to Kóthi Karnung. Here he halted 5 days, sent his Múnshi Ramchárn, and 2 Chaprássi's to Kashmír, purchased 60 horses and provisions, and with Munshi Mohámmad Hássan a native of Pesháur, Dr. Harkíshen, Gosht Mohámmad Khánsamah, myself, and Mohámmad Amín of Yárkand and his 3 followers proceeded to Ladák. When we reached a place 3 days journey from Leh, Mohámmad Amín pointed out to the Sáhib a road viâ Sirikúl to Kókand by which he suggested to Mr. Schlagintweit to proceed. Mr. Schlagintweit consented to this proposal, dismissed Dr. Harkíshen, 2 Chaprássi's and 2 others employed in the survey office to return to Hindostán (India), sent

* This official visit took place end of December 1856. Our brother Adolphe was then in the suite of Sir John Lawrence, when he had his interview with Dost Mohámmad Khan at Jamrúd near Pesháur.

† Guláb Singh the King of Kashmír, died in August 1857; his successor is his son Rámbir Singh.

one Chaprássi with his heavy baggage to Ladák, and he himself with Mohámmad Amín and some other followers went to Chúsel [near the Lake Tsomognalarí, the great salt Lake of Pangkóng.] There he hired 60 porters and with them set out.

After three days journey Munshi Mohámmad Hássan of Pesháur having taken a horse out of Mr. Schlagintweit's stable away at night ran away and carried away with him his book of accounts. Mr. Schlagintweit sent to search after him a man, named Ráhiman, a native of Bálti, and lent him a horse to ride on; but he also never returned. Mr. Schlagintweit halted 3 days in the same uninhabited country and then taking Mohámmad Amín and 2 natives of Tíbet went to discover the way. By means of a telescope he at last found a way, and started with his baggage, but in reality we missed the proper route, and after a weary journey came by the side of two small lakes, the water in one of which was reddish, and in the other greenish, but both bitter [saline,] so that all his followers through despair began to lament and sigh to return.

[The difficulties of travelling, here described, perfectly agree with what we had to experience ourselves during our passage over the chains of the Karakorûm and the Küenlüen. We had to travel without any trace of a road, 21 days and had not met with one man. In these great elevations, 15,000 to 18,000 E. feet, we found no wood, extremely scarce food for our horses and scarcely drinkable water in sufficient quantity.]

Upon this Mr. Schlagintweit dismissed some Tibetans together with one Chaprássi by name Múrli. He then with myself, Mohámmad Amín of Yárkand and his 3 followers, Gosht Mohámmad Khánsamah and 2 Tibetans resumed his journey, and on his way met with only a single house situated in a deserted tract of country from which the city of 'Elchi, the capital of Khotan, was distant by 3 days journey.

On our going with Mr. Schlagintweit from Sultánpur to Yárkand. our way lay through an uninhabited country; for our master had selected a new route and marked it with stones as he went along and drew a sketch of it.

This was a way, which led straight to Yárkand, without passing through Leh; but with the exception of a few inhabited huts [on

the Tibetan, southern side of the Karakorúm] in some places, the whole of the tract was an entire wilderness. Mr. Schlagintweit, however, did not proceed from this single house situated at 3 days marches from 'Elchi, to the direction of this city, but turned towards Súget where he stayed 3 days. Mohámmad Amín here again urged upon Mr. Schlagintweit not to proceed to Yárkand, but to Sirikúl, and thence on to Kókand. Mr. Schlagintweit consequently set out for Sirikúl.

On the 3rd day he came up to the summit of a Pass where the night we arrived snow fell to a great extent; the horses that he had brought with him were all taken away by the servants of Mohâmmad Amín, but we next morning went in pursuit of the robbers, and Mohámmad Amín with one of his servants who was a Jew also accompanied us. [This must have been Murád.]

We at last recovered 7 horses from the thieves, and sent Mohámmad Amín and his servant ahead to search for the rest. Mohámmad Amín had not instigated his men to rob our Sáhib of his horses, but they of their own accord had done the deed. On our return we asked Mr. Schlagintweit to retire down the Pass in order to be safe from the severity of the cold, and to get provisions. He accordingly descended from the Pass and reached Shúmla Khója, where Mohámmad Amín also came up with the 3 remaining horses, which had been stolen, and dispatched his servant by name Murád, the Jew, to Yárkand, to bring information of the wars that were then going on there. The Jew returned and reported that it was the Khan of Kókand who had been making war. We therefore without hesitation set out for Yárkand, and sent Gosht Mohámmad Khánsamah under the care of a Caravan back to Kángra, with a present of a horse valued at 200 Rupees, besides 200 Rupees in cash, and an order for 300 Rupees on Kángra.

[Also Mohámmad Amín mentions nearly quite the same about Gosht Mohámmad being dispatched to India and about the sums he received in cash and in a draft on Kángra.

Fully aware of the danger of his positions, Adolphe most probably had sent him to Kángra for taking charge of and for deli-

vering there observations, drawings and collections, and he also gave him the rather large amount mentioned above for enabling him to get these objects down to Kángra.

Till now we have not heard anything about Gosht Mohámmad; but we have written immediately to Kángra and to Muradabád (his native place) requesting, that the most careful inquiries after him might be made.]

We passed through Kárgalik and Bozgán and arrived at the camp of Dil Khan Sáyad of Kókand who had come with an armed multitude to make a religious war with Yárkand. His camp lay outside the city, and about an hour after our arrival, the army of the Khatáis* which formed the garrison of the city came out to encounter the besiegers on the open field and routed them, and obliged Dil Khan to fly. Mr. Schlagintweit likewise leaving all his baggage there, fled with his followers to Négsar, and thence went to Káshgar. Here another Sáyad of Kókand named Váli Khan who had likewise come on a religious expedition had succeeded in getting the throne of Káshgar; Mr. Schlagintweit desired an interview with him, but it was refused and a guard was sent to apprehend us.

They accordingly carried us prisoners into the presence of Váli Khan, who ordered Mr. Schlagintweit to be beheaded, and so the order was instantly carried out. Váli Khan did not ask any question of Mr. Schlagintweit before his murder, and he was executed outside the city of Káshgar. He was allowed no burial, but a man, named 'Atta Báe, a native of Yárkand, had collected his bones, and Mohámmad Amín assured me, that he would send them over to India viâ Ladák. This tragedy occurred about 17 months ago [August 1857].

Váli Khan then sent me, and Mohámmad Amín of Yárkand, and Murád a Jew, and a native of Tíbet to prison; and afterwards sold me as a slave to a man called Túzak for 25 Rupees by reason of my being a native of India.

A month after an army of Khatais came and expelled Sáyad Váli Khan of Kókand together with the inhabitants of Káshgar,

* Khatái is the name given to the Chinese in Turkistán.

who took refuge in Kókand. I also accompanied [the fugitives, and on my arrival at Kókand a Sáyad of Pesháur by name Mián Khalíl procured me freedom by paying to my master Túzak the amount which he had paid for me.

After I was set at liberty I stopped in Kókand for 10 months, during which time I sent three petitions to the king intimating that Mr. Schlagintweit had been murdered, and praying that justice might be done to him. But the king of Kókand, without giving me any reply, tore up all my petitions. When I was in Kókand, it was the season of winter and consequently I never went out to see the country.

I met Mohámmad Amín of Yárkand at Kókand who advised me to return to India, and said that he would again apply to the King of Kókand for justice in the case of Mr. Schlagintweit.

Meanwhile the King of Bokhára prepared to make an inroad on Kókand, upon which, fearing bad consequences from a longer stay at Kókand I went to Bokhára.

On my departure from Kókand, Mohámmad Amín gave me a Persian letter for delivery to Colonel Edwardes in Pesháur, which I now present.

From Bokhára I came to Balkh, from Balkh to Kábul, and from Kábul to Pesháur.

10. *Letter from Mohámmad Amín of Yárkand, to Colonel Edwardes, dated Kókand, 29th July,* 1858.

I went to Sultánpur, then to Lahól and over a Pass reached Rúpchu.

Here two roads diverge, one leading to Leh, and the other to Chúsel. My master asked me to direct the way to Aksáe Chin, we consequently proceeded thither and passed through Changchen-mo and having crossed a high ridge, [this is the Karakorúm chain] we came up to the road leading to Aksáe Chin*. We arrived at a place, whereabout 2 forts were situated. The one was said to have belonged to Sikánder and was situated on the flanks of the Yu-

* It is very characteristic of Mohámmad Amín to see, how little he complains, compared with 'Abdul, about the difficulties of the road.

rungkásh Pass. [We ourselves have also passed with Mohámmed Amín through Sikánder Mokám on the 18th of August 1856. It is a small now deserted fort; it seems never to have been anything else but a fortified place and was never permanently inhabited. Alexander the Great after whom it is named, is well known to the inhabitants of Turkistán, partly in historical, partly in more fabulous form; his name appears several times in geographical terminology]. The other fort lay on the banks of the Karakásh which is one of the streams that flow through Khótan.

Travelling along the Karakásh river [and after having crossed the Küenlün] we came down the main stream of Khótan and passed through Shaidúlla Kóhja which was intersected by two roads one connecting Yárkand with Tíbet, and the other leading to Tashkorgán, Osh and Kókand.

We halted at Shaidúllah Khoja for five days. It was 20 days' journey from this to Osh viâ Tashkorgán, and 5 days' journey to Yárkand.

Mr. Schlagintweit told me that the way through Tashkorgán and Osh was very long, and that to Yárkand comparatively short, and that he would take the latter. I remonstrated that the latter was a dangerous, and the former a safe way. He then sent Murád the Jew to bring information from Yárkand. The Jew returned after 8 days in the company of eight caravans, and reported that the Khan of Kókand had wrested from the people of Khatáis [Chinese] the provinces of Káshgar and Yárkand.

I however discredited the report, and said to Mr. Schlagintweit that the real Khan of Kòkand would never undertake such a distant expedition; but that since 12 years some of the Bára Sáhibs [great men] of Kókand, who were Sáyads by birth, having collected vagabond outlaws, and all sorts of ragamuffins, made frequent inroads on Káshgar, and sometimes succeeded in defeating its Governors, and occupying their throne, and at other times were repulsed by the Chinese army, and obliged to retreat, that one of them Chíkchik Khója had once fallen into the hands of the army of Khatáis, and was since in confinement; and that, I added, if wars were going on at Káshgar, they must have been waged by these Sáyad fanatics, and not by the Khan of Kokand.

Mr. Schlagintweit nevertheless persisted on going to Yárkand [since the road to Kóshgar and Kókand was equally dangerous on account of the disturbances coming from this direction, and since at the same time the distance to these places was much greater]. He sent back Gosht Mohámmad Khánsamah in company with a caravan to Kángra, and made him a present of 300 Rupees in cash, and an order for Rupees 300 on Kángra.

We then set out for Yárkand; on our approach the inhabitants of that place treated with great courtesy, and furnished us with provisions; Mr. Schlagintweit also gave them presents suitable to their several ranks and deserts.

From thence we proceeded to Káshgar which was then occupied by a Khója of Kókand who had defeated the original Governor and wrested from him his provinces, but the army of Khatáis was also encamped outside the city, and laid siege to a Fort called Gul-Bágh situated about a mile from the town.

The Mussalmáns of the garrison every day came out and gave them battle. The fight was going on when we arrived; the Mussalmáns asked who we were, Mr. Schlagintweit replied that he was the Honorable East India Company's Envoy and was going to the Khan of Kókand.

Upon this they got into a rage and ordered Mr. Schlagintweit to be beheaded, and I with my followers to be thrown into prison, and plundered of all our property. In 35 days of our confinement my two servants died, and the third was missing.

Meanwhile the army of Khatáis having been reinforced from Máha Chin* overpowered the Khója, and obliged him to fly, I consequently got my release, placed the remains of Mr. Schlagintweit in charge of Murád for safe custody and proceeded to Kókand.

I have been 8 months in Kókand; and as the way to Káshgar remained blockaded during that time, and no traveller could pass to and fro, I could send no message to you; however lately Envoys have been sent and received from Káshgar and peace restor-

* Máha Chin, *i. e.* Great China or China Proper, in comparison to the Chinese Province of Turkistán.

ed; and the Khan of Kókand has deputed a man named 'Aka Sikál to Káshgar to bring about the state of affairs on the old footing. I shall therefore shortly leave for Káshgar, and, having taken the remains of Mr. Schlagintweit, shall proceed to Pesháur.

Dated Berlin, 15*th March* 1859.

SIR,

Lord Stanley, the Secretary of State for Indian in Council, has been kindly pleased to send us for our information a most carefully compiled collection of official papers and memoranda, which the Government of India as well as several Civil and Military Officers have been good enough to collect in the hope of elucidating the fate of our brother Adolphe Schlagintweit, in charge of the Magnetic Survey of India since 1854.

The papers contain:

1. A large and most elaborate Memorandum, which Captain Henry Strachey, 66th Gorkhas, has given himself the great trouble to compile partly from evidences of several Natives partly from notes contained in the Indian Newspapers. This memorandum is accompanied by another most valuable communication, the result of Captain Strachey's indefatigable personal inquiries.

2. Letters from the Dewan of Kashmir to the Chief Commissioner of the Punjâb.

3. Several evidences taken by Major Lake and Messrs. Knox and Taylor, the Civil Officers of the Kangra District.

Besides these official letters the following gentlemen obliged us by private communications:

a. Rev. H. Jäschke, Missionary at Kyelong in Lahoul with whom, before starting for Ladak, Adolphe had the pleasure of staying some weeks. The Rev gentleman also was kind enough to take charge of part of his luggage and of such spare instruments as Adolphe did not think advisable to take with him on his journey to the North.

b. A. C. Gumpert, Esq., Consul of Hamburg and Odenburg at Bombay who had kindly put himself in communication with several

Officers of the Punjáb and regularly forwarded us the results of his inquiries.

c. Lord Elphinstone, Lord William Hay, Major Ramsay, Hon'ble W. Elliot, L. Bowring, Esq., W. Russel, Esq., the particularly well informed special correspondent of the "Times," and some other gentlemen, equally obliged us, when occasion presented itself, with their advice and information in addition to that which we owed to the Indian Press. In England especially Col. Sykes, M. P., and Sir Roderick Murchison communicated to us any letters they had rec ved ; in Germany it was chiefly our celebrated and most kind friend, Baron Humboldt, who assisted us in making our inquiries.

From an examination of these papers there is but too much reason to fear that Adolphe Schlagintweit has lost his life in Central Asia, probably in Kashgar after having left Yarkand.

Captain Strachey's last memoir, Almora, January 1858, says:

" After the siege of Yarkand was raised, Adolphe Schlagintweit " had joined the camp of the Turks and accompanied them as far " as Kashgar. As they were carrying off with them a lot of their " prisoners to be sold for slaves, some of the Bissahirs being " among the number, Adolphe Schlagintweit remonstrated that " they were British subjects and should be released. On this " arose a dispute. The Turks accused Adolphe Schlagintweit of " taking part with their enemies and ended by killing him."

A quite recent letter December 31st, 1858, (January 11th, 1859,) from Mr. Vardouguine, Russian Officiating Consul at Tchougoutchak in the Russian part of Central Asia, seems also to confirm his death. We received this letter through the energetic exertions of Prince Gortschakoff, and it was delivered to us by Baron Budberg, the Russian Minister at Berlin. This letter had taken an admirably short time to reach us, being the answer to a request of November 8th, 1858. In this letter he is said to have been killed by order of Bouzrook Khan from Kokand who had besieged Kashgar and invaded Turkistan.

We feel most deeply obliged for all these numerous proofs of general sympathy in Europe and India, and we allow ourselves to

draw the attention of our friends in India to the fact, that even now it will not be quite impossible to save at least through their zeal a great part of his journals, observations, instruments and collections, which are the more valuable on account of the countries in which they were made.

Captain Henry Strachey states, that according to information he received, several boxes with collections, drawings, books and some instruments are in Dehra in the Surveyor General's Office; the Missionaries of Lahoul have informed us, that similar objects are still left in their charge; we do not think it improbable that even those, which Adolphe Schlagintweit carried with him, during his travels in Turkistan, might be recovered by a plan we have the honor to propose.

We are perfectly aware, that these objects cannot be got without Government's usual energetic assistance, and without the sanctioning the comparatively small expenses necessary for this purpose. In consequence of the following extract of a letter addressed to us by the India House as early as July 1858, we consider it our duty, again officially to request the kind assistance of Government.

The letter says:

" With reference to the letter addressed by General Sabine to " the Secretary of the Royal Society, dated 14th May 1858, in " which he states that the 80 stations visited by " Messrs. Schla- " gintweit" are independent of those visited by Adolphe Schla- " gintweit in his last and fatal journey of which they have a pros- " pect of receiving a journal and observations," the Court expect that you " will use every exertion to recover your late Brother's " Memoranda of the researches on which the Government of India " employed him.

" (Signed) J. D. Dickinson."

We therefore have the honor to propose in reference to his manuscripts and collections:

1. That the objects at Dehra be repacked in accordance with Captain Strachey's plans.

2. That the Missionaries at Lahoul be requested to send at Government's expense from Lahoul to Kangra the collections, observations and instruments, etc., and to draw up a Report, specifying the claims to which Hari Chand, the son of the Negi of Lahoul is entitled, for the journies he undertook last summer in search of our brother.

3. That a note may be issued to the Lieutenant Governor of the Punjáb and to the Commissioners of Kamaon, Simla and Kangra, authorizing them to distribute freely circulars in the vernacular languages among the trading people of their districts, promising a reward for any papers, drawings, instruments or othor property of Adolphe Schlagintweit delivered to them, the amount of remuneration being dependent on the nature and quantity of the property restored. It is beyond all doubt, that the traders would carry on such circulars to Kashmir, Ladak and the countries of Central Asia which Adolphe Schlagintweit has visited.

4. That all the instruments, collections, and observations thus recovered, be forwarded to us, if small parcels overland to Berlin, if boxes to London, addressed "Schlagintweit, India House," for being worked out and put up like our other collections.

Finally, we have the honor to add that copies of this circular note have been officially dispatched :

To the India House, London, to the Seats of Government in India, and to the following Officers and Gentlemen in India :

Col. R. J. H. Birch, Calcutta ;
L. Bowring, Esq., Priv. Secy. to the Govr. Genl. ;
The Commissioners of Kamaon, Kangra, and Simla ;
G. Edmonstone, Esq., Calcutta ;
Hon'ble Walter Elliot, Madras ;
A. C. Gumpert, Esq., Bombay ;
Rev. Jäschke, Lahoul ;
W. Muir, Esq., Allahabad ;
Colonel Ramsay, Nepal ;
W. Russel, Esq., Oude ;
The President of the Asiatic Society, Calcutta ;
Major Richard Strachey, Calcutta ;

Captain Henry Strachey, Calcutta;
Colonel Waugh, Mussoori.

We have, &c.

HERMANN SCHLAGINTWEIT,
ROBERT SCHLAGINTWEIT.

NOTE.—For the foregoing papers, so replete with a painful interest, we are indebted to Hon. Walter Elliot.

We have, as far as possible, reprinted from the original, only venturing upon a few clerical corrections of little importance and in no way affecting the sense of the passages.—ED. M. J. L. S.

SCIENTIFIC INTELLIGENCE.

Report on the Progress of the Magnetic Survey, and of the Researches connected with it, from November 1855 *to April* 1856. *By* ROBERT SCHLAGINTWEIT.

GENERAL OUTLINE OF THE ROUTE.

My brother, Adolphe, and I left Agra on the 29th of November 1855, and went through Dholpore and Chanda to Gwalior. We proceeded thence through a part of Bundlekund, by Dutteeah, Jhansi, Tehri, and Dhamoonee to Saugor, which we reached on the 4th of December.

From Saugor we took different routes. Adolphe proceeded by Dhumow to Nagpore and Madras. I left Saugor on the 19th of December, and proceeded by Maharajpore and Bermhan to Nursingpore, on the left side of the Nerbudda valley; from thence I proceeded by Jhansi Ghaut and Meergunge to Jubbulpore, where I arrived on the 30th December.

The route which I followed from Saugor to Jubbulpore afforded me the gratifying opportunity of examining the large deposits of fossil remains of elephants, rhinoceros, hippopotami, &c., which are exposed on the sides of the Nerbudda valley, and I have been able to obtain a tolerably good collection of specimens.

During a stay of six days at Jubbulpore, I was engaged with a series of barometrical and meteorological observations, and with some chemical experiments on the composition of the atmosphere, which were afterwards repeated on the Umerkuntuk Hills.

I started from Jubbulpore on the 6th of January, and went by Mundlah, Ramgurh, Goruckpore and Karenchia up to Umerkuntuk, which forms a very important part of the water-shed of Central India. Near it are the sources of the Soane and Tohilla, of the Nerbudda, and of the Yrap, an affluent of the Mahanuddy.

I arrived at Umerkuntuk on the 20th of January 1856, and having set up my meteorological instruments, which were regularly registered during my stay, I made excursions to the sources of the Tohilla and Soane, and up to the summit of Rajmeergurh Hill, which is one of the highest points of the Mekul range, East of Umerkuntuk.

The plateau of Umerkuntuk afforded me a favorable opportunity of making physical and meteorological experiments, and though the absolute elevation is not very considerable (3,290 to 3,330 English feet,) the data obtained for the decrease of the temperature of the air, and of the ground, &c., may not prove without some interest for the physical geography of Central India, when compared with similar data obtained in the Himalayas, the Neilgherries, and Cossyah Hills, &c.

I left Umerkuntuk on the 26th January, and proceeded *viá* Paindra, Moonda, and Amukpore to Sohagpore; thence in a Northerly direction, through Kanrodi and Ramnuggur, crossing the Soane River twice, to Rewah, where I arrived on the 11th of February.

By Mungown and Sohagi, I went to Allahabad, and thence along the Grand Trunk Road to Agra, where I arrived on the 21st of February.

At Agra the whole of the collections sent down last year from the Himalayas, and those made during this cold season, were carefully re-packed for the purpose of being sent to England.

I left Agra on the 8th of March, and travelled *viá* Delhi to Saharunpore, and thence to Nahun, where I was engaged, for several

days, examining the geological structure of the Sewalik range. I obtained many interesting tertiary fossils from various localities in the Sewaliks.

I marched through Dugshaie to Simla, where I arrived on the 25th of March.

The observations made in the outer ranges of the Himalayas, and in various localities in the environs of Simla, will be reserved for the next Report, treating of the Himalayas.

METEOROLOGY.

Temperature of the air.

Besides the daily registry of dry and wet bulb thermometers and barometers, whilst on the march, a longer series of observations were made at Saugor, Bermhan, Jubbulpore and Umerkuntuk; at Sohagpore, Allahabad, Agra and Simla. These observations seem to lead to the following conclusions.

Minimum temperature of the air.

The minimum temperature of the air was very regularly observed to set in just before sun-rise, but there was never to be observed a second depression of temperature immediately after sun-rise, as we had observed in the Indian Seas in October 1854.

The increase of temperature from sun-rise up to 11 o'clock A. M. is especially rapid between the hours of 8 and 9. A. M. I often noticed an increase of temperature of 4 to 5 degrees centigrade between these two hours.

The total increase from sun-rise to 11 o'clock was, at Saugor, (15th to 19th December,) as much as 28 degrees centigrade; at Jubbulpore it was from 12 to 15 degrees; but at Umerkuntuk (20th to 26th January) the difference between sun-rise and 11 o'clock A. M. was only 8½ to 9 degrees centigrade. Between 11 A. M. and 4 P. M., the variation of temperature was generally not very great—not more than 3 or 4 degrees centigrade; but the decrease of temperature between 4 P. M. and 7 P. M. was very rapid.

East of Jubbulpore, at Ramgurh, and as far as Umerkuntuk the minimum temperature of the day was very near the freezing point; but I never observed a temperature lower than 32 degrees Fahrenheit, or 0 degrees centigrade.

There was quite regularly a hoar-frost setting in, even if the minimum temperature of the air was 2 or 3 degrees above the freezing point. The hoar-frost was produced by the great radiation of the leaves and grass during the serene nights.

Irregularities of temperature at Umerkuntuk.

At Umerkuntunk itself I observed some remarkable irregularities of temperature. Considering the cold temperatures experienced in the stations of the Nerbudda valley, Westward of Umerkuntuk, it might be expected to find the minimum temperature of the night at Umerkuntuk below zero; but on the contrary the minimum temperature of the air on the plateau, at the end of January, was constantly 9 degrees and even 12 degrees centigrade above the freezing point. It was therefore considerably warmer than the minimum of the valleys at the foot of the plateau. Besides the minimum does not take place just before sun-rise but one, or one-and-a-half hour earlier. The reason of this phenomenon is that during the night, the cold air, which is heavier, flows down along the sides of the hills, and accumulates at the bottom of the valleys, whilst at the top of the small plateau itself, the cold air, which is locally formed by the radiation of leaves and grass, is immediately carried away by the winds into the surrounding atmosphere and re-placed by somewhat warmer air.

During the day-time the temperature at the top of Umerkuntuk, is, of course, much lower than in the valleys below. During my stay there the highest observed temperature was 75 degrees Fahrenheit, exceeding by 5 degrees Fahrenheit the maximum temperature of all the other days.

There was only one day quite free of clouds during my stay at Umerkuntuk. Generally, soon after 8 o'clock A. M., quantities of cirri dispersed all over the sky, and mitigated the full power of the sun's rays: they only dissolved themselves partially in the evening before sun-set, some portions remaining even during the night.

I had some rain on the 29th and 30th of January, it appeared to have extended over a large area, and greatly affected the temperature of the air, cooling it down so, that the maximum temperature was lowered more than 5 degrees.

Winds.

From Jubbulpore up to Umerkuntuk, a strong South-West or South wind set in very regularly, between 9 and 10 A. M., and continued till 5 or 5-30 P. M. The nights were constantly calm. At Umerkuntuk the wind blew from the same direction, but it was quite calm during the rain falls. I had not the least wind on the journey from Paindra to Rewah, where again a South-West wind began.

When comparing my meteorological observations with those made during the cold season of 1854-55 by my brothers and myself, in Southern parts of India, the Deccan, Mysore, &c., I find that in Southern India there is, at equal elevations never so cold a temperature as I observed this season in Central India, in the valley of the Nerbudda, &c.

In connexion with this fact, it deserves mention, that in summer the reverse takes place, and that the maximum heat of Central India, at equal elevations, generally exceeds somewhat that of Southern India.

Barometrical observations.

Together with the observations of the dry and wet bulb thermometers, the readings of the barometer were registered, and I have been able to determine the heights of all important places on the route followed. Some stations were determined both by the barometer and the boiling point thermometer, which by its minute and accurate divisions (each degree of Celsius is divided into 100 parts) and having been carefully compared at different heights with barometers, may be considered as giving equally accurate results with the barometer itself. On the journey from Sohagpore to Rewah, I used only this instrument, as the barometer was leaking very much, and some air had introduced itself into it.

The minimum of barometric pressure at about 4 P. M. occurred on the small plateau of Umerkuntuk, very nearly at the same time as in the lower valleys and plains of Hindoostan, and the daily variation of the barometer seems to be very nearly the same at Umerkuntuk as it is in the plains.

Temperature of the earth.

The temperature of the earth, at different depths, was determined by the long thermometer (one metre in length.) For greater depths I used a ther-

mometer, the bulb of which was made extremely insensible. The observations of the temperature of the ground at Umerkuntuk, compared with similar data around the base of the hill, afford some curious examples of the cooling influences which extensive jungles have upon the temperatue of the ground. At Umerkuntuk the temperature was, 22nd to 25th January.

At one metre below the surface....	21° 2′	Centigrade.
„ two metres, „	21° 5′	„

At Paindra, more than 1,000 feet lower than Umerkuntuk, the temperature was, 27th to 29th of January—

At one metre below the surface....	20° 0′	Centigrade.
„ two metres, „	21° 0′	„

I observed similar differences at Ramgurh, and at some other stations West and North of Umerkuntuk, which are all 1,000 to 1,300 feet lower than the plateau.

This anomalous phenomenon seems to be due to the following causes.

The plateau of Umerkuntuk itself has comparatively little jungle, and the ground is exposed freely to the action of the sun. Round the base of Umerkuntuk, and especially on the slops of the hills, very thick and extensive jungles prevail, which keep the ground moist and cool, as they prevent the heating of the surface by the powerful tropical sun.

Influence of jungle on the temperature of the ground.

The meteorological observations which I had occasion to make in many parts of the jungles of Central India, as well as those of my brother Hermann in Assam, and of my brother Adolphe in the Godavery jungles, offer many striking examples of the cooling influence which extensive jungles exercise in India on the temperature of the ground, as well as on the atmosphere.

The anomalous cooling of the ground by jungles is still more apparent than the difference of temperature in the air of jungles when compared with open Districts, since the differences in the temperature of the air are much more equalized by winds and atmospheric currents.

At Agra I was enabled, through the kind assistance of Colonel J. T. Boileau, the Chief Engineer, to ascertain the temperature of the earth nearly 50 feet below the surface. The insensible thermometer was sunk in a small shaft dug for the purpose, and remained buried there for a fortnight before it was taken up. The temperature was, from the 22nd of February to the 4th of March, 28° 3' centigrade, equal to 82° 9' Fahrenheit. The temperature thus observed accords, within one degree, with the temperature of the earth at about 60 feet below the surface, ascertained at Benares in April 1855. The temperature at one metre below the surface at Agra was only 25 degrees centigrade, as the upper strata had been cooled by the influence of the past cold season.

Wells colder than the temperature of the ground.

The temperature of the wells at Agra was always a little lower than that of the ground, thus directly ascertained. As an average of several wells from which a large quantity of water was constantly drawn for domestic purposes and irrigation, I obtained 27° 6′ to 27° 8′ centigrade.

The temperature of water in wells, which are but little used, is considerably cooler than that of wells from which water is constantly drawn, as the cold air which sinks down during the night into the wells, cools stagnant water much more than it can do the water of wells which is constantly removed.

Distribution of jungles in Central India.

As a curious phenomenon connected with Physical Geography, I finally beg to mention the way in which the jungles are distributed in Central India.

The base and slope of the hills, and the valleys between them, are generally covered with very dense and extensive jungles, but the summit of the flat hills and small plateau which occur in many localities, are nearly always quite bare and destitute of trees and jungly vegetation. I had been informed by my brothers, that this very curious phenomenon occurs all along the Southern parts of the Cossyah and Jynteah Hills, and on the plateau of the Neilgherries.

This phenomenon seems to be due, in part, to the very strong

winds which sweep over those isolated plateau and which evidently must be very injurious to jungle vegetation. Another important cause is, the want of moisture in these isolated plateau.

Geology.

The geological results obtained in the journey from Agra to Saugor will be contained in the Report which my brother Adolphe will have the honor to submit to Government; I shall therefore content myself by mentioning some geological results to which the investigation of the country visited by me alone seem to lead.

Fossil remains in the valley of the Nerbudda.

In the valley of the Nerbudda some interesting deposits of fossil remains occur. The larger deposits are found from Bermhan up to Mundlah, the bones are found in a brown alluvial clay, and belong to species of elephants, rhinoceros, hippopotami, buffaloes, &c. I also found with the bones well preserved fossil shells of Unio, Melania, and other fresh-water species. A comparison of these fossil shells with those now living in the Nerbudda and in various tanks of Central India, of which I collected a large number, will assist in determining the geological age of the fossiliferous deposits of the Nerbudda valley.

From Jubbulpore to Umerkuntuk the prevailing rock is black trap, identical with the trap of the Deccan.

I found in several localities the thin lacustrine deposit, which reposes on trap, and is again overlayed by other layers of trap. In some places it was full of fossil fresh-water shells of Physa, Unio, Melania, &c.

The principal fossiliferous localities which I visited were Phool Saugor, about 9 miles west of Mundlah, Bellasur, and Bonder.

The plateau of Umerkuntuk is one of the culminating points of Central India, and this place, and the hills in its neighbourhood, form the importent water-shed of Central India, between the Rivers Nerbudda, Soane, Tohilla, and Mahanuddy. The plateau of Umerkuntuk is not very large—it is nearly circular, and surrounded by hills, which are only 50 to 60 English feet higher. The slopes are very steep to the East and South, whilst they are much more gentle to the West and North. The hills run from Umer-

kuntuk first in a Northerly direction, and then turn to the North-West. They are generally known by the inhabitants under the name of Mokul. The highest point of this range will probably be Rajmeergurh, near Umerkuntuk, which it exceeds by about 500 English feet—the latter place itself is about 3,290 to 3,330 English feet.

Origin of the Nerbudda.

The Nerbudda alone rises on the plateau of Umerkuntuk. It has its origin in a tank or pool, surrounded in the most irregular way, with solid masonry and fine temples :—one of the oldest of them seems to me to be a Jain (Boodhist) temple. The tank is fed by subterranean springs, and the origin of the Nerbudda is thus precisely similar to that of the Kistna, on the plateau of Mahableshwur in the Deccan.

I determined the quantity of water at the spot where the Nerbudda flows out of the tank, and found it to be, on the 23rd of January, only two French litres per second. But very soon this little rivulet is met by the waters of two other springs, and only a few miles from its source it is joined by the waters of two more springs, and forms a beautiful cataract of about 70 English feet.

The Soane has not its rise at Umerkuntuk, but to the East of the hill, and about 1,200 feet lower than the Nerbudda in an open partially cultivated spot, from a tank called Soane Budder, 8 miles East of Paindra, and forms a swampy marshy place over a considerable extent.

The Tohilla rises about 5 miles North of the Nerbudda, at a place called Tohaletsur, nearly in one level with the Nerbudda.

The Yrap, a small river which flows to the South, and joins the Mahanuddy, has its origin near Paindra, from several large tanks, forming at first a swampy ground. Its source is situated about 5 or 6 miles from that of the Soane, and its water-shed is not formed by a distinct ridge, but only by a slight rising of the ground.

On the journey from Sohagpore through Rewah to Allahabad, I took the opportunity ef carrying a barometric and geological section over the plateau of Bundlekund.

The plateau, or rather the succession of plateau, consists of a

reddish and white sandstone, in large banks, which are generally horizontal—it reposes upon limestone and shales of blue and grey colors, which very often are a little more inclined than the sandstone, and the shales are quite identical with similar rocks which I observed in the Gwalior Territory. The plateau of Bundlekund terminates abruptly about 40 miles South of Allahabad, where the sandy deposits of the plain of Hindoostan begin.

Report on the Proceedings of the Magnetic Survey, from January to May 1856. *By* HERMANN SCHLAGINTWEIT.

ROUTES.

AFTER having completed the observations at Gowahatty, detailed in the last pages of the Report No. III., I left Gowahatty December 21st, and proceeded up the Brahmapootra to Mungeldie; from there to Oodulgoorie on the Frontier of Assam and Bhootan.

I found occasion to proceed from this place into the country of the Kampo-Bhootans, who occupy the Himalayas East of Bhootan Proper; while my Assistant, Mr. Adams, and the Draftsman, Abdool, who accompanied me as far as Oodulgoorie, went to the coal mines and salt wells in the Baree Dihing.

I made arrangements, immediately after my arrival at Oodulgoorie, with a former Rajah of Towang-Chang-To, who was found willing to be my guide as far as Nurigoon, which is about one-third of the breadth of the Himalayas.

I staid four days at Nurigoon, and had occasion to make, besides magnetic observations, (the instruments had been, till used, carefully concealed in cotton bags) an excursion on the Zinghyla (Deer Mountains) for surveying the different valleys and for making some drawings.

Besides I got here very precious information (not from the inhabitants but from traders coming down from Thibet) about the routes to Lowany, only 4 marches distant, and to Lhassa.

A very intelligent Bhooteea from Tussisoodun constructed even a map with vertical Section of the different places, in the Chinese style, of the route from Nurigoon* to Lhassa, which agreed very well with the verbal informations I received from the Thibetans.

Nurigoon is on a rock at the left side of the Riju, the houses on an average between 3,200 to 3,500 feet high, and offered many interesting features for comparison with the Western Himalayas.

The valleys are here much more *gradually rising* than in the Westen parts of the Himalayas; at the same time the height of the mountains is less great, and the inclinations less steep. The vegetation has the luxuriant character peculiar to the Eastern Himalayas, though the quantity of rain is much less than in the lower ranges of the Naga, Khossia and Garrow Hills, on the left side of the valley of the Brahmapootra.

Yâks come down from Thibet as far as Nurigoon in the cold season and chiefly near the end of it, when the trade to the plains is greatest; but also wild elephants are very frequent in the valley of the Dhunsiri and the Riju, and are occasionally met with even a little above Nurigoon. Such coincidences of lower and upper limits of animals, so different in reference to their zones of altitude, may perhaps be not without interest in explaining the variety of fossil remains in places formerly in similar local and climatological conditions.

I left Nurigoon January 13th, and went to Tezpore, from there to Debrooghur in Upper Assam, where, besides my own observations, I had occasion to get many precious informations, particularly by Colonel Hannay, about geological objects.

From Debrooghur I descended the Brahmapootra and went by Goalpara, Serajgunge, Koolna, and through the Sunderbunds to Calcutta.

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* N. B.—This map is added to the drawings, Portfolio the 6th, sent from Calcutta to the Hon'ble the Court of Directors.

After a stay of twenty-nine days I proceeded by Cawnpore, Agra and Umballa to Simla, visiting Lucknow in Oude and Meerut for magnetic observations.

I arrived at Simla on the 24th. From here the Eastern part, Ladak, and the ranges of this part of the Himalaya and the Kuen-luen, will be examined.

Two of the four Sikhim men I had with me in Sikhim and Assam, the Lepcha Chezy and the Bhootea Dublong, are to make during this summer some observations in Sikhim, furnished with some thermometers, a boiling thermometer, and a prismatic compass.

Mr. Montairo, attached to my Establishment for collections left Darjeeling August 23rd, and went to Calcutta, where he received and prepared, for being sent to Europe, the objects of collections sent down to him from the Khossia Hills and Assam. He arrived at Simla May 20th. He is going *viâ* Kangra to Kashmere.

Magnetic Observations.

Magnetic observations have been made at the following Stations:—

Assam and Delta of the Ganges.

1. *Oodulgoorie*, on the Bhootan Frontier—December 30th and 31st, 1855, January 1st, 2nd, 3rd and 4th, 1856. Declination, horizontal intensity, vertical intensity, and a set of observations for ascertaining the daily variations, longitude and latitude.

2. *Nurigoon*, in Bhootan—January 9th, 10th and 12th. Declination, horizontal and vertical intensity, longitude and latitude.

3. *Tezpore*, on the right shore of the Brahmapootra—January 24th, 25th and 28th. Declination, horizontal and vertical force, longitude and latitude.

4. *Debrooghur*, Upper Assam—February 5th and 6th. Declination, horizontal and vertical intensity, longitude and latitude.

Gowahatty—see preceding Report.

5. *Serajgunge*, on the right shore of the Kenur River—February 17th. Vertical intensity.

6. *Dacca*—February 21st. Vertical intensity.

7. *Koolna*, on the right shore of the Bhogrup—February 24th Declination, vertical force, longitude and latitude.

8. *Calcutta*, Botanical Garden, March 23rd and 24th. Declination, horizontal and vertical intensity, longitude and latitude.

B. Plans of the Ganges in Hindoostan.

9. *Benares*—April 3rd and 4th. Declination, horizontal and vertical intensity, longitude and latitude.

10. *Lucknow*, Oude—April 8th and 9th. Declination, horizontal and vertical intensity, longitude and latitude.

11. *Agra*—April 15th. Declination.

12. *Meerut*—April 18th. Declination.

The magnetic elements were therefore determined from between latitude 22′ to 27° 5′ N. in the valley of the Brahmapootra, and to 29° in the plains of the Ganges, including a difference to longitude of 16° 5′ from 95° to 78° 5′ East of Greenwich.

One of the general results was, that the magnetic force, particularly the dip, has been found much greater the general formulæ made it expect.

A.—In the valley of the Brahmapootra, delta of the Ganges, the dip was found—

	°	′	
At Debrooghur,..................	38	29	175
„ Tezpore,......................	37	14	58
„ Oodulgoorie,..................	36	27	52
„ Nurigoon (Bhootan,)..........	37	11	69
„ Gowahatty....................	35	18	73
„ Serajgunge...................	32	3	15
„ Dacca........................	31	0	80
„ Koolna.......................	29	18	49
„ Calcutta.....................	28	6	4

B.—In the plains of Hindoostan it was—

At Benares......................	32	40	9
„ Lucknow......................	35	18	20

A similar result has been found by my brothers for the parts of corresponding latitude in the North-West Provinces and in Central India.

The Southern part of India seems to agree better with our results of calculation.

The declination was not found as irregularly altered in any of the places examined, as formerly in Cheerapoonjee; though the gite r oc ks in the valley of the Brahmapootra on both sides of the river are identic with the rock of the Khossia and the Garrow Hills along the left edge of the Brahmapootra valley, vary different from the geological situation of the Himalayas along the right side of the valley. Some of these rocks in the valley contain, as well as the Northern parts of the Khossia Hills, a very great amount of magnetic iron (in the rocks near Doobree Colonel Hannay recently has found it particularly predominant); but the action on the * * is confined to the place itself, and becomes at a very small distance untraceable.

The declination in the territory examined was East, being greatest at Koolna and decreasing East and West of it. In Assam, as well as in Meerut, a small increase is caused by the difference in latitude. In Nurigoon, as in the Himalayas in general, the declination is decidedly greater than the difference of latitude would make us expect.*

A.—The declination was found in the valley of the Brahmapootra and Delta of the Ganges—

		°	′	
At Debrooghur	N.	2	8	E.
„ Tezpore	N.	1	59	E.
„ Oodulgoorie,	N.	2	5	E.
„ Nurigoon (Bhootan,)	N.	4	5	E.
„ Gowahatty,	N.	1	41	E.
„ Koolna,	N.	2	55	E.
„ Calcutta,	N.	2	24	E.

B.—In the plains of Hindoostan—

At Benares,	N.	1	27	E.
„ Lucknow,	N.	1	12	E.

* Compare the observations of my brothers in Gurhwal and Kumaon and my observations in Sikhim, Report III. page 6 and Report VI.

At Agra.........................N. 1 14 E.
,, Meerut......................N. 1 28 E.

METEOROLOGY.

In Assam the variations of the temperature of the Brahmapootra, observed from Debrooghur to its ramifications in the Delta, was a particularly interesting object. I also had occasion to make, besides the regular observations on temperature, moisture and pressure of the air, several experiments on the thermic influence of surfaces covered with grass and tree jungle; besides Dr. Simmons, at Gowahatty, kindly assisted me by making, during my absence, observations on the ozone contained in the air, with papers identic with those used by myself.

These observations are continued for the next year. The following Table contains* the temperature found in the Brahmapootra in its ramification and in the Delta from Debrooghur to Calcutta. The daily variations, even in Upper Assam, scarcely exceeded O. 5 degrees C.—O. 9 degrees F., but occasionally differences of 2 to 3 degrees F. are found even in the very current caused in some cases by differences of depth, in others by lateral rivers discharging themselves in the Brahmapootra.

I choose for the Table the temperature of the rivers at 11 A. M., this hour representing very nearly the * * of the twenty-four hours for the water; for the temperature of the air for the same reason the temperature at 9 A. M. was selected. Errors of the zero points of the Thermometers, Nos. 29, 70 and 88 are corrected.†

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* A second series during the hot season is made now by my Assistant, Mr. Adams, on his way down from Sudiya.

† For the Hooghly, at Calcutta, I was furnished with observations on the monthly variations of the temperature at high and low water by the kind assistance of Mr. Schiller. The observations are now continued by Dr. Thomson.

Names of Rivers.	Names of the nearest Places.	February. 1856.	Temperature of the water at 11 A. M.	Temperature of the air at 9 A. M.
			Centigrade. ° ′	Centigrade. ° ′
Brahmapootra..	At Debrooghur........	6	15 6	12 4
,,	Above Dikhoo Mookh..	8	15 7	12 6
,,	Above Dhunsiri Mook..	9	16 2	13 7
,,	Tezpore...............	10	17 1	16 2
,,	At the mouth of the Kulluny............	11	17 2	15 8
,,	Gowahatty...........	13	17 5	14 6
,,	Above Doobree.......	14	17 8	17 0
,,	Below Doobree........	15	18 4	19 3
,,	Bugwa................	16	19 4	18 6
,,	Hajeepore............	17	19 3	18 7
Zuboona.......	Serajgunge...........	18	19 6	20 7
,,	Amerbad............	19	19 7	22 1
Kertinana.......	Senpore..............	20	21 2	21 7
Bargunga......	Kalaghaut............	21	22 8	22 8
Damudar	Burrissole.............	22	21 6	21 8
Charcollee......	Bidaboorea...........	23	21 6	21 4
Passur.........	Koolna...............	24	22 0	20 5
Seprah	Near Grant No. 214 Sunderbunds........	25	23 5	23 4
Terra Banka.....	Near Grant No. 155 Sunderbunds........	26	23 8	25 5
Moree Gunga...	East of Saugor Island...	27	24 6	26 1

The variation of the temperature of the air is 26° 1′, 12° 6′, 13° 2′, C., of the water 24° 6′, 15° 6′, 9° C.

In the Dhunsiri and in the Riju, the difference between the temperature of the Dhunsiri near Orang in the valley of Assam and of the Riju, a lateral affluence of the Dhunsiri at Nurigoon, was Dhunsiri, 18° 1′

Riju, - 9° 0′ 9° 1′ C.

During my journey from Calcutta to Umballa, I tried, besides, several times, some experiments to measure the heating power of the sun's rays under various conditions.

I used for a complete observation the following thermometers :—

1.
2. } Dry and wet bulb for temperature and moisture of the air.

3. A thermometer exposed to the sun with white bulb. It had no brass scale, and a very thin capillary tube for the mercury, surrounded by a larger glass tube, the ordinary from of thermometers on the Continent. This has the advantage, that the instrument * * * * * * * with nearly no error the temperature of the mercury in the * * * * * * undisturbed by the * * * * influence of appendices.) But even in this shape a thermometer offers no absolute measure for insolation, the whiteness of the glass forming the bulb, its color and transparency modifies very appreciably the apparent action of the sun on different instruments.*

4. A thermometer of a similar construction, with blackened bulb.

5. A Kew standard thermometer, with thick glass tube and a division being in the glass stem. It had its bulb blackened, and also half of the mantle of the cylinder behind the division. This, as well as the following, was placed on a large surface of black wood, which getting heated all round, very nearly as much as the thermometer itself, prevents it from irregular loss of heat towards objects of different temperature in its vicinity; for instance the presence of grass or gravel, &c., would otherwise affect the height of the thermometer. It may be considered as a good proof of the comparability of the thermometers in such an arrangement, that the Kew standard and the following thermometer, No. 6, stood very nearly alike.

6. A boiling thermometer, every degree divided in $\frac{1}{50}$, the mercury begins to reach the divided scale only at 78 degrees C. being intercepted by a second enlargement of the bulb. Bulb blackened. The mercury contained in the capillary tube being here only a very small part of the mercury under the black stratum, and being protected besides by a second outer glass cylinder against loss of heat, I found this instrument the best for these experiments as long as the insolation is hot enough to keep it on the

* For relative determinations for distance, for raising the annual and daily variations, careful observations with any thermometer can be very useful.

divided part. Besides the $\frac{1}{100}$ of the degree being read with perfect accuracy, it showed very rapidly even the minutest changes in the atmospheric conditions.

7. The surface of the ground. The thermometer was laying in the reddish sand forming the general deposit in the plains of Hindoostan. It was during the first experiments covered with a stratum of the sandy soil about 1 centimetre thick, but in the experiments at Umballa, a little hole was filled with mercury and this covered with the stratum of the soil. This arrangement made, that the thermometer was, through the medium of mercury, in a much more intimate contact with the particles of the soil, the temperature of which it is to indicate.

8 and 9. Metals exposed to a tropical sun are felt remarkably hot when touched, though the conducting power has in this evidently a great part. Their real temperature seemed an interesting object for direct determination. I therefore exposed two metal vessels, the one was an iron bottle, well screwed and filled with mercury to two-thirds of its volume; the other was a flat square copper basin (used generally as an artificial horizon,) it was blackened, and about two cubic centimetres of mercury were put upon it, forming isolated drops. Both were put upon a soft and thick layer of cotton. For the observation of the copper basin, the cotton was slightly pressed down at one place, so as to incline the basin without touching this itself, and to cause the mercury to collect itself in one corner. Then the thermometer was dipped in the mercury, which it could be expected had assumed the temperature of the metallic surface with which it was in contact.

The following Table contains the reading of the different thermometers at Umballah; the correction for index errors are applied to the reading. The instruments with black bulb, and on black wool, were read with a telescope from 4 to 5 feet distance, since any approaching for reading with a magnifier altered very suddenly the indications of the thermometer.

Observations on insolation at Umballa, April 22nd 1856, Centigrade.

Hours, Local time		6 A. M.	7-15	8	9	10	11	11-54	1-4 P. M.	2	3	4	5-30
Height of the Sun	Lat. 30° 20′ 7″ N.	6° 12′	18° 7′	31° 9′	44° 75′	56° 9′	67° 25′	71° 9	60° 5′	56° 9′	44° 75′	31° 9′	12° 6′
Air	Dry	21° 2′	22° 8′	24° 7′	33° 1′	34° 3′	36° 4′	38° 2′	39° 3′	39° 7′	39° 4′	39° 3′	39° 3′
	Wet	9° 5′	10° 9′	12° 1′	16° 3′	16° 4′	17° 2′	18° 3′	18° 0′	18° 0′	17° 9′	17° 9′	18° 0′
Sun	White	..	..	..	36° 3′	37° 7′	41° 4′	42° 2′	43° 4′	43° 4′	42° 7′	41° 4′	40° 7′
	Black	..	..	..	38° 4′	40° 8′	44° 1′	45° 8′	45° 2′	45° 1′	45° 1′	42° 9′	42° 3′
Sun	Keen	..	..	..	57° 5′	77° 2′	73° 9′	87° 5′	67° 9′	67° 4′	58° 2′	52° 0′	49° 0′
	Boil	..	..	..	..	80° 65′	..	89° 47′	..	..	..	..	..
Surface of Ground		In shade 90° 3′	In sun, 32° 3′ Shade, 21° 0′	..	..	4° 3′	47° 9′	50° 2′	51° 7′	51° 9′	49° .9′	48° 2′	44° 2′
Metal	Black Surface	..	..	..	..	..	..	..	55° 2′	55° 2′	53° 7′	50° 3′	
	Metallic Surface	..	..	..	..	..	..	..	54° 4′	54° 2′	52° 0′	50° 5′	

REMAKS—Some small clouds at 11 A. M; hazy, but no clouds from 12-10, with W. by N. wind ; hot wind.

The haze, during the experiments at Umballa, though generally accompanying the hot winds, modified the heat, particularly for the boiling thermometer; also, the small clouds, though very thin, and not before the sun at the moment of the reading, had caused a sensible depression in the black thermometers *on the wool;* the other black bulb, freely suspended, being much less sensible for the rays of the sun, since the objects against which it radiates change their temperature but very little (*see* " Surface of Ground,") went on steadily rising.

The great heat of the *air* lasting till sun-set is very characteristic for days with hot winds in general; also the surface of the ground keeps remarkably warm in the first evening hours, though it loses 25 degrees C. during the night.

Notwithstanding this great variation, no particle of dew is deposited in these regions during nearly three months, the wet bulb thermometer sinking still 10 degrees lower during the night than the dry one.

The power of the sun's rays was also determined at Benares and Cawnpore.

At Benares the boiling point thermometer, in an arrangement like the one just described, was exposed on the 3rd of April.

It stood at	12 H. 30 M.	....	78° 15'	Centigrade.
Note.—The readings are corrected for index errors.	1 ,, 5 ,,	....	82° 60'	,,
	1 ,, 10 ,,	....	84° 23'	,,
	1 ,, 15 ,,	....	84° 08'	,,

The maximum sees to fall decidedly after 12 (the sun's power decreasing less rapidly than the loss of radiation is diminished by the general increase of the temperature of the air continuing till 2 or 3 P. M.) The maximum on normal days, without clouds, and with very light wind, seems to be reached pretty regularly at 1*h.* 10*m.* to 1*h.* 20*m.* P. M. (*See* Allyghur.)

At 1*h.* 29*m.* the wind at Benares became more violent, about 6·5 metres per second, and was *felt* very hot. To my surprise the thermometer immediately went down, the thermometer with white bulb

in the sun also fell, though very little. Evidently the instruments had gradually surrounded themselves with a stratum of heated air, corresponding with the temperature of the mercury, which, during the periods of stronger wind, was removed, and replaced by one less hot.

The readings were

At 1-42 P. M......... 82° 60' Centigrade.

Wind increasing very much at 1-44...... P. M.

Thermometer at 1-46 P. M............. 78° 74' ,,

It rose again, in a slight lull, from 1° 53′ to 2° 10' ,,

It stood at 2-10 80° 45'; then the wind setting in again, it gradually sank, and soon (2-35) disappeared below the divided scale.

At Allyghur, April 17th, the day was particularly clear; the West wind hot, but not very strong. Here I found the highest temperature I had till now observed, *viz.* 90° 30' C. or 194° 54' F,* the time of this maximum, 1-20 P. M., coinciding very nearly with the observation at Benares.

I was enabled to compare my instrument with one used by Mr. Gubbins,† the bulb of which was protected against lateral radiation, by being enclosed in a double cylinder of glass. The two instruments agreed, at least for the maximum, better than might have been expected. The time of the maximum was, naturally, not so well defined in the one enclosed in the glass tube, as in the other laying on wool: the former was slow to cold before the period of its maximum, to warm afterwards. The readings were on April 3rd—

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* Corrected as the following for index error.

† We are deeply indebted to Mr. and Mrs. Gubbins for the communication of a series of most accurate meteorological observations, which not only embraced the ordinary objects of observation, but in which, at the same time, a great variety of experiments were combined with equal skill and ingenuity.

	Schlagintweit. Hypsometer No. 5.	*Gubbins.* In glass cylinders.	Black bulb exposed free.
	° ′	° ′	
12-0 ..	88 58 C. 191 44 F.	190 5	126·0
1-15 ..	90 13 C. 194 23 F.	Disturbed by approaching too near.	127·1
1-20 ..	90 30 C. 194 54 F.	189 5	128·5
1-45 ..	86 10 C. 186 98 F.	188 0	119·0
2-35 ..	80 60 C. 177 08 F.	185 0	122·0

When the hot winds are very violent, they diminish the power of insolation very much by the quantity of dust they raise, which very often, like thick aqueous clouds, completely hides the position of the sun, and sometimes even produces a darkness like the thickest fog. I had occasion to notice a particular coloration of the sun during dust-storms, which is, I think, quite a regular phenomenon accompanying them, when the air has reached a certain degree of untransparency.

In fogs the disc of the sun is red, or at least of a decided reddish tint, when sufficiently darkened to be looked at without a dark glass. In dust-storms the sky has also, as in fogs, a decidedly reddish color, which in this case is that of the dust itself, but the sun's disc is blue, a phenomenon evidently connected with the suspension of solid particles in the air.* I observed this color best on the 6th of April at Futtehpore. The hot wind lasted from 12-45 to 6-10 P. M., and stopped very suddenly after sun-set. The sun was very much obscured as early as 1 P. M., and showed then the blue appearance so decidedly, that it looked like the sun's disc seen through a dark-blue glass, the shadow of a thin cylin-

* A similar dust-cloud passing perhaps at a small height above the ground may explain the blue appearance of the sun mentioned in the Second Edition of Sir John Herschel's *Astronomy*.

der falling on white paper was nevertheless well defined and reddish, showing that the illuminated paper had received rays of the (complementary) bluish color.

The blue color of the sun, though the light was gradually much diminished, lasted until 5-10 P. M., when the sun had a height only of about 15 degrees : then the disc soon disappeared entirely behind the clouds of dust.

The temperature of the air* was corrected for index errors on the 3rd of April—

	Dry.		*Wet.*		
	°	′	°	′	
At 12,.............	38	2	19	9	Direction of the hot winds West, very strong, from 12-45 to 6-10.
1,.............	38	1	19	0	
2,.............	37	3	19	3	
3,.............	37	3	19	3	
4,.............	37	3	19	2	
5,.............	36	7	19	1	
6,.............	36	4	18	9	

The temperature of the air diminished, as occasionally noticed in the observations above-mentioned, with the increase of the wind and untransparency of the air.

A coincidence worthy of notice is the sudden cessation of the wind after sun-set, which took place at every one of my observations. Generally speaking, it is characteristic of the hot winds; that in the beginning of the hot season the wind always ceases very near sun-set, the night is very calm, and towards the morning an Easterly breeze is not unfrequently felt.

The cause of the hot winds ceasing with sun-set seems to be the great depression of temperature during the night, coinciding with the Westerly direction of the wind. In consequence the wind meets, soon after sunset, with surfaces covered with a stratum of air cooled by the vicinity of the radiating surface of the ground ; the hot wind passes over it, and is therefore not felt near the surface.

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* A room with tatties was easily kept at 25° to 27° C. in the centre of the apartment, the wind being very strong.

It is only during the middle, and towards the end of the hot season, that the hot winds blow till 2 or 3 o'clock in the morning, when the rains stop them suddenly.

Also, the hour of the day at which the hot winds *commence*, is variable from the beginning to the end of the hot season. In the first months they begin to blow at 12 or perhaps 1 P. M., then the period becomes gradually earlier, till a short time before the rains they begin at 6 or 7 A. M., leaving only a few calm hours in the very early part of the morning.

The quantity of carbonic acid during the hot winds is very small. It reached in an experiment at Allygurh*, scarcely $\frac{1}{100}$ in 10,000 parts of air, the ordinary quantity being 3·5 to 4 parts in 10,000.

Geological Observations.

Of the valley of Brahmapootra, a detailed map has been prepared, showing the different soils, with observations on former levels and beds of the river, and depths from the surface deposits to the sub-soil. Different coal localities in the Bhootan Himalayas, and in the Naga Hills, have been examined and entered in this map.†

These observations, compared with the examinations of the different soils of the Delta of the Ganges, show that the valley of the Brahmapootra differs from the Delta in being covered with lacustrine deposits, occasionally varied by the coarse gravel brought down by the Himalayan Rivers on its North-Eastern side.

The course of the actual Brahmapootra, originally flowing in the bed of the Lohit, (which was the original name used in this valley,) has not been altered by a sudden change of its bed, but has gradually shifted itself, the deposits made on the right bank (where all lacustrine soil is carried away and replaced by the actual deposits of the river) being very different from the clays on the left.

* The quantity of air examined was 50,000 cubic centimetres, the increase of weight of all potassium tubes reached was not a full milleogramme.

† This map, in four sheets, scale four miles to an inch, has been sent with my manuscripts to the Hon'ble the Court of Directors.

In the Himalayas, along the North-East side of the Brahmapootra, the coal is found in small seams of sand-stone alternating with strata of conglomerates of pebbles (Nageflue,) the pebbles being remarkably smaller than the deposits of the present rivers.

To these sedimentary rocks succeed, at a short distance from the banks (much shorter than in the Western Himalayas,) crystalline hornblendic rocks, chiefly hornblendic gneiss, with a peculiar linear arrangement of quartz nodules succeeding each other, when seen, in the proper section, like beads on a string.

The dip of the stratification in the sand-stones and conglomerates, which form the outer ranges of the Bhootan Himalayas, is very well defined by the alteration of the finely grained sand-stones with the conglomerates.

The dip of the strata is North 30 degrees to 40 degrees West, inclination 55 degrees to 65 degrees.

In the crystalline hornblendic rocks, the cleavage, which is well developed, dips also in the same direction. The mean direction of this dip was also found North 30 degrees to 35 degrees West, inclination 55 degrees to 60 degrees.

It is deserving of remark, that this dip of stratification and cleavage planes are quite analogous to the direction of dip in Sikhim and the Western Himalayas of Kumaon and Gurhwal. In all these parts of the Himalayas the dip of the cleavage is chiefly Northerly, varying in different parts to the East or to the West,

HERMANN SCHLAGINTWEIT.

A Storm at Chicacole.

Mr. Thonhill, Principal Assistant Collector of Ganjam reported on the 5th August 1858, for the information of Government, that a slight shock of an earthquake was experienced in Chicacole on the 3rd instant at 3½ P. M. It was accompanied by a rumbling sound like thunder and seemed to travel from South to North.

A Storm at Tranquebar.

Mr. W. M. Cadell, Collector of Tanjore, reported on the 26th April 1859, for the information of Government as follows :—

" Since the morning of the 23rd instant there has been a very heavy and unusual fall of rain in this part of the district, accompanied with strong gales from N. E. to E. N. E. As far as my information at present goes, the rain would appear to have been general, but the violence of the wind seems to have been felt less inland than on the Coast.

" I fear there must have been considerable loss of property and life at sea; and reports have already reached me of the stranding of an Arracan Ship and of the wreck of a Dhony at Trimalavassell; also that 2 Brigs (Native) are ashore at Cauverypatam and 2 more at Karical. Part of the keel of a Native vessel was washed ashore here this morning, and there are several vessels in the offing with loss of masts, spars, &c. As far as I have yet been able to ascertain there has happily been no loss of life.

" The wind has moderated since yesterday at noon, but the weather has still a wild and unsettled appearance, and to-day again it is very showery accompanied by squalls.

" I am afraid there is reason to believe that there will be much damage to the new embankments and other earthworks which are being so extensively carried on this season, and I apprehend also the loss in Salt (the manufacture of which had just come into full operation) will be considerable. The Government will, I trust, be assured that no effort will be wanting on my part or on that of my Subordinates to repair and restore the damages which may prove to have occurred, and regarding which fuller information will be submitted hereafter."

Annexed is a Memo. of the Rain fall.

	I.	M.	T.
April 23rd..............	3	1	0
,, 24th...............	10	5	3
,, 25th...............	4	6	8

Mr. W. M. Cadell, Collector of Tanjore, reported on the 29th April 1859, as follows:—

" It is with much regret I have to state for the further intimation of Government that the reports which have since reached me shew that the weather was much more severe in other parts of the district than I had represented, and that a hurricane seems to have prevailed in the neighbourhood of Negapatam which has been attended with the most disastrous consequences both to life and property.

" During the height of the hurricane, the British barque " Monarch" which had sailed for Penang from Negapatam on the 22d instant, with 200 coolies on board, came in contact with the British ship " Ballynceich" bound from Calcutta to Glasgow, and both ships were so disabled that they immediately came ashore about 8 miles to the south of Negapatam. The crews of both vessels were for the most part saved, but one has since died from the building, where he was lodging in Negapatam having fallen in. The coolies were, I regret to say, nearly all drowned. In addition to these vessels, and those mentioned in my letter of the 26th instant, from 30 to 35 vessels and those chiefly square rigged ones have been wrecked between this and Calimere, but the crews have, I believe, nearly all been saved.

" The hurricane seems to have prevailed with the greatest violence in the latitude of Negapatam, but its foree seems to have diminished in proportion as the distance from the sea was more remote. Many houses and trees have, however, been blown down in all parts of the district and the rain fall, as far as I can yet learn seems nowhere to have been less than from 15 to 20 inches, a quantity, I believe, altogether unprecedented at this season of the year.

" Reports have also reached me that several of the river banks have again given way, and the communication between Tanjore and the eastward is again interrupted, the Tappal having in one place to be brought on a raft.

" From the discoloured appearance of the sea to a considerable distance from the shore, I conclude that the rivers are all in full

fresh, and indeed the water reports which have reached me this day show that some of them are already so. I fear therefore that there are grounds for apprehending that many of the new embankments will have given way.

"I have, however, put myself immediately in communication with Captain Oakes, and immediately the water subsides, every endeavour will be made jointly with the Officers of the Department Public Works to repair the damages which have been sustained, and to restore the embankments before the regular freshes make their appearance."

PROCEEDINGS.

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Soeiety, held at the Club House, on Thnrsday the* 14*th October* 1858, *at half-past* 6 *o'clock*, P. M.

PRESENT.

The Hon'ble Walter Elliot, Esq., *Chairman.*

R. Burgass, Esq.	G. F. Fullerton, Esq.
M. Norman, Esq.	W. Huddleston, Esq., *Secy.*
W. C. Maclean, Esq., M. D.	

The Secretary laid before the meeting the usual monthly statement of the Society's Funds prepared up to the 14th Instant.

Resolved, that the foregoing statement is satisfactory and be passed.

Resolved, that a memorandum of deficient numbers of the Library set of the Society's Journal be circulated to Members, with a request that they will, if possible, aid to complete it.

Resolved, that Dr. Kellie be requested to make efforts to find or replace the missing volume of the Journal as it breaks the Library set.

A prospectus for the Publication of "Monographie des Picides" having been laid before the Committee, they are of opinion that it is not desirable to subscribe to the work, the cost of which appears to be francs 450.

Resolved, that the names of the additional subscribers to the Plant Scenery of the World be published in the next number of the Journal and be communicated to Dr. Cleghorn.

Resolved, that the thanks of the Society be conveyed to Dr. Balfour for his Index to Articles on Geological subjects published in the Society's Journal, which, with the letter accompanying it, will be made over to the Journal Sub-Committee.

The Secretary's proposal to publish similar Indexes to Articles in the Journal on special subjects, such as accounts of partially known localities in the Presidency, Natural History, Botany, Mineralogy, Contributions to the History of the country and its Antiquities, &c., and to circulate a prospectus proposing to publish Collections of the Articles, is reserved for further consideration.

Resolved, that the Honorable Sir C. Rawlinson be informed, with reference to his letter of the 12th Instant that Volumes from 3rd to 6th inclusive of Merivale's History of the Romans under the Empire will be included in the list of Books to be ordered from England by the next mail.

The Committee acknowledge the receipt of a very interesting Paper by Lieut. R. H. Beddome treating of new species of the Genus Impatiens, these species being found chiefly on the Annamullay Hills.

Resolved, that the thanks of the Society be conveyed to Lieut. Beddome, and that the paper be referred for publication to the Sub-Committee on papers.

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Society held at the Club House, on Thursday the* 11*th November* 1858, *at half-past* 6 *o'clock*, P. M.

PRESENT.

The Hon'ble Walter Elliot, Esq., *Chairman.*

The Hon'ble Sir A. Bittleston, M. Norman, Esq.
R. Burgass, Esq. G. F. Fullerton, Esq.

The usual monthly statement of the Society's Funds, prepared up to 11th Instant was laid before the Committee.

Resolved, that the foregoing statement is satisfactory and be approved.

Read letter from Messrs. Allen and Co., dated 9th October 1858, stating that in consequence of a new Regulation of the P. and O. S. N. Company, they will be compelled in future to render their invoices via Marseilles instead of via Southampton.

Resolved, that a reference be made to Mr. Franck for explanation of the new Rule referred to in the letter above alluded to.

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Society, held at the Club House, on Thursday the 9th December* 1858, *at half-past* 6 *o'clock,* P. M.

PRESENT.

The Hon'ble Walter Elliot, Esq., *Chairman.*

M. Norman, Esq. G. F. Fullerton, Esq.
Captain G. Winscom.

The usual monthly statement of the Society's Funds prepared up to 9th Instant was laid before the Committee.

Resolved, that the foregoing statement is satisfactory and be passed.

Read a letter from M. Norman, Esq., pointing out that several remarks have been inserted (in pencil writing) in Mill's India in 1858, and in the Calcutta Review.

Resolved, that measures be adopted for the future preventing of the evil pointed out in Mr. Norman's letter.

Read a letter from Messrs. Thacker, Spink and Co., stating that the Society will gain 5 Rupees per annum by paying for the Calcutta Review in advance, and that back numbers of that publication can be supplied at reduced prices.

Resolved, that payment in advance for the Calcutta Review be made to Messrs Thacker, Spink and Co., and that they be request-

ed to supply such numbers of that work as are required to complete the Library set.

Read letter from Mr. L. D. Rozario, Assistant Librarian, requesting an increase of salary on the grounds of his long service and large family.

Resolved, that the request of Mr. D'Rozario cannot be complied with.

Resolved, the Librarian be directed to forward Catalogues and invitations to join the Society to such gentlemen at the Presidency as may be supposed likely to become Members.

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Society, held at the Club House, on Thursday the* 13*th of January* 1859, *at half-past* 6 *o'clock*, P. M.

PRESENT.

The Hon'ble Walter Elliot, Esq., *Chairman.*

M. Norman, Esq. W. Huddleston, Esq., *Secy.*
Captain G. Winscom.

The Secretary laid before the Meeting the usual monthly statement of the Society's Funds prepared up to 13th Instant.

Resolved, that the above statement is satisfactory and be passed.

Read a letter from the Rev. D. Simpson, M. A., Secretary to the Society for Promoting Christian Knowledge, requesting that the Literary Society will have their printing orders executed at the Press of the Christian Knowledge Society.

Resolved, that as the Society have no cause to complain of the Printers who at present perform their printing work, and have been employed for some time past, they are unable to comply with Mr. Simpson's request.

Read a letter from H. Newill, Esq., forwarding two numbers of the Practical Mechanics' Journal containing an article on a method of cooling the air of Rooms in Tropical climates.

Resolved, that the thanks of the Meeting be conveyed to Mr. Newill for his communication, and that the article alluded to be forwarded to the Sub-Committee of Papers, with a recommendation that it be re-published in the Society's Journal.

Resolved, that the thanks of the Meeting be conveyed to Lieut. Ferguson, Superintendent of the Government Observatory at Bombay, for the copy of Magnetic and Meteorological Observations for the past year, received with his letter of the 3rd December 1858.

Read letter from Major General Blundell, C. B., bringing to notice that numerous marginal Remarks have been made in Harvey's two years in India.

The Committee observe with regret that the highly objectionable practice of disfiguring the books of the Society by remarks in pencil writing has recently been brought to their notice by more than one gentleman, and they hope that no member will in future afford ground for such complaints.

A. J. Arbuthnot, Esq., Director of Public Instruction, having applied for the loan of certain books from the Society's Library, for public purposes, it was resolved that so many of the books applied for as may be available be sent to that gentleman.

The Honorable Mr. Elliot produced a Photographic copy of the inscriptions on the Iswaran Pagoda in the little Fort of Tanjore, a Roll 23 feet in length, and represents all the inscriptions engraved on a zone passing completely round the main building. The zone consists of 99 slabs, each containing nine lines of ancient Tamil characters, the seen pictures of which have been admirably taken by Captain Tripe, so that every letter can be distinctly read.

Above this zone is a second forming a convex moulding, also covered with letters which are likewise included in the picture; but owing to the form of the stones the lower part of the convex surface was so entirely thrown into the shade that the letters were not visible.

The portion that is on the plane surface contains five complete separate grants, four by Raja Raja Deva Chola and one by Rajendra Chola, relating to subjects of considerable interest.

M. Norman, Esq. laid before the Meeting a Galvano plastic cast of a Santhal's head; being the specimen sent out by the Messrs. Schlagentweit of a set of 250 casts to be published by them, and which have been already ordered for the Madras Central Museum, as sanctioned by Government.

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Society held at the Club House, on Thursday the* 10*th February* 1859, *at half-past* 6 *o'clock,* P. M.

PRESENT.

The Honorable Walter Elliot, Esq., *Chairman.*

W. H. Bayley, Esq.	Captain G. Winscom,
H. B. Montgomery, Esq., M.D.	G. F. Fullerton, Esq.
Major W. J. Wilson,	W. Hudleston, Esq., *Secretary.*

The Secretary laid before the Meeting the usual monthly statement prepared up to the 10th Instant.

Resolved, that the above statement is satisfactory and be passed.

Resolved, that a remittance of £200 be made to Messrs. Allen and Co.

Resolved, that the Rev. Mr. Gorton be informed that his request that books may be supplied to him at Vellore cannot be acceded to, there being no duplicate copies of works in the Library, and single copies being insufficient to admit of books being sent to so distant a station.

Resolved, that the Secretary be requested to endeavour to obtain copies of Numbers 9 and 32 of the Calcutta Review, to complete the Library set.

Resolved, that the thanks of the Meeting be conveyed to T. Oldham, Esq. for Vol. one, Number two of the "Memoirs of the Geological Survey of India," and that he be informed that the Society will have much pleasure in continuing an interchange of publications.

Resolved, that Thursday the 3rd of March next, be appointed for the Annual General Meeting, to be held in the Strangers' Room at the Club, at 6 o'clock P. M., and that a Notice to that effect be published in the Fort Saint George Gazette.

Resolved, that the thanks of the Meeting be conveyed to the Philological Society of London, for the presentation of three volumes of their Transactions for 1854-55, and 56, and that a copy of the Literary Society's Journal be forwarded to that Institution, as published, and from the commencement of the new series.

Read a paper received from the Honorable Mr. Elliot, being an Historical Account of the Fort at Vellore, by Captain Hawkes.

This paper appears to be a copy of a Memorandum prepared in 1815, and gives a traditional account of the Fort and Temples from the year A. D. 1365, from the building of the Fort by a Telugu Chieftain, to its subsequent possession by the Mahrattas, and its final conquest by the Mahomedans, from whom it passed to the British, several notes are added by Captain Hawkes, in illustration of the text.

Referred to the Committee of Papers.

At a Meeting of the Managing Committee of the MADRAS LITERARY SOCIETY, *and Auxiliary of the Royal Asiatic Society held at the Club House, on Thursday, the* 17*th March* 1859, *at half-past* 6 *o'clock*, P. M.

PRESENT.

Hon'ble Walter Elliot, Esq., *Chairman.*

W. C. Maclean, Esq., M. D.
G. F. Fullerton, Esq.
H. Nelson, Esq.
J. D. Mayne, Esq.
W. Hudleston, Esq., *Secy.*

The Secretary laid before the Meeting the usual Monthly Statement of the Society's Funds prepared up to the 17th Instant.

Resolved, that the above Statement is satisfactory and be passed.

Ordered, that the thanks of the Society be conveyed to the Royal

University of Christiania, Norway, for their contribution to the Society's Library, and that the Volumes already published of the new series of the Journal be forwarded to them, with an intimation that succeeding Numbers will be supplied as published.

Read letter from Messrs. Schlagintweit communicated by the Honorable Walter Elliot, Esq., regarding the specimens of the Galvano Plastic Heads already dispatched for the Government Museum.

Resolved, that application be made to Government for a further sum of £37-4-0 due for the specimens despatched.

Messrs. Schlagintweit report that 81 specimens of the Ethnographical Groups of Heads have been dispatched by the Ship "British Lion," which sailed in Decemer last.

These form a portion of 12 distinct groups, and the whole number to be eventually produced is 272 in 14 groups according to races.

AGRI-HORTICULTURAL SOCIETY.

Proceedings of a Meeting of the Committee, held on Wednesday, October 27th, 1858.

PRESENT.

Hon'ble W. Elliot, Esq., *President.*

Colonel A. McCally. Colonel H. Colbeck.
A. J. Scott, Esq., M. D. H. B. Montgomery, Esq., M. D., *Secy.*

Read proceedings of last Meeting.

The Secretary states that on the suggestion of Colonel Colbeck, 50 varieties of Roses have been sent for, and may be expected by the end of next month.

The Committee determine that when plants from these become available, they shall be distributed to Members, and the remainder sold to the public.

The English seeds recently received being now exhausted, and the Committee learning that numerous applications have been since received, it is determined that a copy of the proceedings of this

meeting be forwarded to all persons (Members or others) to whom seeds have been sent. The Committee would feel much obliged by a brief report as to the success which has attended the sowing this year. It is also determined to register applications for seeds so as to allow of these being distributed immediately on arrival, early intimation as to the probable requirement of non-subscribers will enable the Committee to increase the quantity of seeds sent for, if required.

Three copies of two very beautiful drawings, "Carter's Floral Illustrations" having been presented by the publisher, the Committee acknowledge their receipt with thanks. They have also to acknowledge the receipt of Carter's Autumn Catalogue of Dutch and Cape flowering Bulls, &c., and the "Manual of Accounts of the Forest Department," from Government.

Read letter from J. Vans Agnew, Esq., stating his desire to be relieved from his duties as a member of the Committee, owing to his inability to attend at the monthly meetings.

Resolved, that R. D. Parker, Esq. be requested to join the Committee

The Secretary intimates that a large and valuable collection of Australian seeds have been presented by Colonel C. A. Browne, who also forwarded a note from Mr. Muller, Superintendent Botanical Gardens at Melbourne, in which a consignment of Indian seeds is requested for the Gardens at Melbourne. The Committee appreciate the desirability of obtaining supplies of seeds from Melbourne and St. George's Sound as opportunity offers, and believe that Mr. George Maxwell of the latter place would probably be disposed to meet the views.

Resolved, that a system of exchange be established with Dr. Muller, and that Mr. Maxwell be requested similarly to enter into correspondence with the Secretary of this Society.

Resolved, that Sir H. Adam Bittleston be requested to become a Vice Patron of this Society.

The receipt from Major General Johnson of a collection of Orchid and other plants is intimated, and the Secretary is directed to forward a suitable acknowledgment of the same.

Contributions from Major Lawford, J. D. Sim, Esq., and Major General Cullen, are similarly recorded, &c., to be acknowledged to the Donors.

Resolved, that the Conservator of Forests be requested to procure some packets of Jungle seeds for the use of the gardens and the purpose of exchange.

Read letter from Captain Harris, Deputy Assistant Commissary General, Rangoon, requesting seeds and plants for the new gardens at Rangoon.

Resolved, that the application be at once complied with. The Committee determine that to afford the members resident up country an opportunity of being acquainted with the working of the Society, printed copies of the proceedings of the monthly meetings be dispatched with as little delay as possible to all Members. Also to enable members of the Committee to arrange for regular attendance; the day appointed for the next meeting shall be recorded in each day's proceedings.

November 24th, 1858.

PRESENT.

Hon'ble Walter Elliot, Esq., *President.*

Hon. W. A. Morehead, Esq.
G. S. Hooper, Esq.
R. D. Parker, Esq.
J. D. Sim, Esq.
Colonel H. Colbeck.
A. J. Scott, Esq., M. D.
H. B. Montgomery, M. D., *Secy.*

Read proceedings of last Meeting which are approved..

Read letter from Sir Adam Bittleston. Kt., accepting the office of Vice Patron of the Society. J. D. Mayne, Esq., was unanimously elected a Member of the Society.

Resolved, that Robert Hunter, Esq., be requested to join the Committee, vice Mr. Prendergast, and that John Young, Esq., be similarly requested, vice Colonel Frederick Cotton about to proceed to Europe.

Resolved, that owing to the departure for England of several members, the Secretary shall bring to the notice of persons recently arrived in Madras the objects of this Society, which do not seem to be sufficiently known.

The Secretary intimates that the consignment of Cotton seeds transmitted by the Cotton Supply Association has been received by the "Dinah Muloch," and the letters relative to it are again considered. The Correspondence with Government relative to its disposal will appear in the proceedings of the next meeting, at which it is hoped that the decision of the Government, in this matter, may be made known.

December 22*nd*, 1858.

PRESENT.

Sir Adam Bittleston, Knight, *Vice Patron.*
Hon'ble Walter Elliot, Esq., *President.*

R. D. Parker, Esq.	John Young, Esq.
C. Dale, Esq.	Robert Hunter, Esq.
Colonel H. Colbeck.	A. J. Scott, Esq., M. D.
Colonel A. McCally.	H. B. Montgomery, Esq., M. D., *Secy.*

The receipt of the consignment of Roses, ordered some months since, is notified. These Roses have arrived in pretty good condition, and will be in due course available for purchase and for distribution to members of the Society.

Some very beautiful Roses were brought to the notice of the Committee. These had been grown by Colonel Colbeck at Royapettah, and prove that these flowers may be successfully cultivated in Madras. The Committee trust, that the new varieties now obtained, will enable members of the Society, and others, to largely increase and vary their collections.

The Secretary requested the Committee to name two of their number to examine and audit the accounts of the current year. The accounts to be henceforward audited annually.

Messrs. John Young and Robert Hunter were requested to act

as auditors for the present year, and the books will be submitted to them on such day as they may appoint.

Members and others indebted to the Society are particularly requested to adjust their accounts.

The following gentlemen were proposed and unanimously elected Members of the Society from the 1st proximo.

Henry Newill, Esq., C. S., J. Talboys Wheeler, Esq., Captain Baldock, George James Shaw, Esq., M. D.

The Committee resolve that the annual show of Fruits and Flowers be held on Thursday the 17th of February 1859.

January 12th, 1859.

PRESENT.

Hon'ble W. Elliot, Esq., *President.*

R. D. Parker, Esq.	C. Dale, Esq.
Colonel A. McCally.	R. Hunter, Esq.
Colonel H. Colbeck.	H. B. Montgomery, Esq., M. D., *Secy.*

Read Proceedings of last Meeting which are approved.

The Hon'ble Walter Elliot desires that in the public notification relative to the Exhibition of this year may be included a renewal of his former proposed prize for the successful cultivation of Bees.

The following Gentlemen were unanimously elected Members of the Society.

Colonel Silver, Captain S. H. Jones Parry, Capt. G. Proudfoot, Major E. W. Boudier, W. Robinson, Esq., W. E. Underwood, Esq.

4. It is unanimously resolved that a Special Committee composed as follows be appointed as a Committee of Management for the Exhibition :—

Colonel H. Colbeck, J. T. Maclagan, Esq., H. B. Montgomery, Esq., Secretary A. H. Society, Mr. R. Brown, Superintendent.

The erection of a new gate at the Cart entrance is sanctioned as by the estimate at a cost of Rupees 37-5-9.

5. Read the following papers relative to the Cotton Seed recently received.

REVENUE DEPARTMENT.

No. 1687.

Extract from the Minutes of Consultation under date the 21st December 1858.

Read the following letter from the Secretary to the Agri-Horticultural Society.

Here enter 20th November, 1858.

Brings to notice the receipt of a letter from the Cotton Supply Association of Manchester, placing at the disposal of this Society and the Chamber of Commerce two tons of the new Mexican Cotton Seed, for experimental purposes, in view to increase the supply of an improved quality of Cotton from India, and requests that the landing charges upon the seed may be defrayed by Government. Suggests the best method of distributing the seed, and requests that the Practical Treatise on the subject (copy of which is herewith sent) may be re-printed for general distribution.

Para. 1. In this letter, the Secretary to the Agri-Horticultural Society brings to the notice of Government, the receipt of a supply of Mexican Cotton seed dispatched by the Executive Committee of the Cotton Supply Association of Manchester, for experimental purposes in this country; and reports the mode in which the Society propose to deal with the subject.

2. The Agri-Horticultural Society state that they are not in a position to initiate any experiments with the seed placed at their disposal, and they solicit the aid of Government in carrying them out; suggesting at the same time a method which, in their opinion, is calculated to secure the experiments being conducted in a satisfactory and conclusive manner. The scheme of operations planned by the Society is described in the 11th and following paragraphs of their Secretary's letter, and is to the following effect.

1st. That the landing charges and duty upon the seed be paid by the Government.

2nd. That excepting a small portion to be retained by the Society, the seed be transferred at Government expense to certain Collectors in view to experiments being made by themselves on the part and at the expense of Government; or by private individuals desirous of making experiments at their own expense.

3rd. That the Treatise on Cotton cultivation accompanying the above letter, be re-printed and largely distributed over Southern India, with a view to public attention being directed to the subject of Cotton growing.

4th. That the Collectors be requested to report in due course on the success of the experiments undertaken by them.

5th. That an outline report to be framed by the Society be circulated to the persons to whom seed may be given; and

6th. The intimation of the plan of proceedings be advertized in the *Fort St. George Gazette* and re-published in all local *Gazettes* free of charge.

3. The Government approve the plan thus laid down by the Agri-Horticultural Society, and will aid them in their efforts to give effect to the object and intentions of the Home Committee. As requested by the Society, the Government will defray the landing charges and duty on the seed as soon as the amount is made known to them, and they will forward a copy of the present correspondence to the Board of Revenue, with instructions to arrange in communication with the Society for the transfer of the seed, and to take whatever other measures may be necessary for carrying out the Society's views in the manner planned by them.

4. In communicating their instructions to the Collectors concerned, the Board will be requested to direct the regular submission of Reports of the success which may have attended the experiments, whether undertaken by themselves or by private individuals. The skeleton report which the Society propose to frame will be a useful aid to the latter, and should be taken advantage of by the Board.

5. The Board will also be desired to have the Treatise on Cotton cultivation re-printed at the *Fort St. George Gazette*, or other Press, wherever the work may be most conveniently and speedily

executed, having as many copies struck off as they may think necessary for distribution.

6. The Government authorize the Secretary of the Society to publish in the *Fort St. George Gazette* a "Notice" in the form D.* accompanying the above letter, and the Collectors will be instructed through the Board of Revenue, to re-publish the same in the local *Gazettes*.

(A true Extract.)

(Signed) W. H. BAYLEY.

Actg. Secy. to Government.

With reference to the above the following arrangement is adopted. Five Barrels of the seed (containing 5 cwt.) will be taken charge of by the Superintendent of the Gardens, and 35 barrels be at once made over to the Revenue Board. The Chamber of Commerce are to be invited *by letter* and the Members of the Society in Madras, *by circular*, to send to the Gardens for such quantities of seed as they may require, which will be furnished on the same conditions as are laid down in the notice, the insertion of which in the *Fort St. George* and local Government *Gazettes* has been sanctioned in para 6 of the above.

Proceedings of a Meeting of the Committee held on Wednesday, February 2nd, 1859.

PRESENT.

Hon'ble Walter Elliot, Esq., *President.*

G. S. Hooper, Esq.	R. Hunter, Esq.
Colonel A. McCally.	J. Goolden, Esq.
R. D. Parker, Esq.	S. D. Birch, Esq.
Colonel H. Colbeck.	A. J. Scott, Esq., M. D.
C. Dale, Esq.	H. B. Montgomery, Esq., M.D., *Secy.*

The Secretary submits to the Meeting a letter from Colonel H. Colbeck, and the Memorandum thereon recently circulated by him.

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* Not inserted.

It was unanimously determined that "the Annual Exhibition proposed to be held on the 17th instant, be postponed to the 24th instant." The Secretary is instructed to advertise this alteration in all the papers and in the *Fort St. George Gazette* with the least possible delay.

The name of Colonel A. McCally is added to those of Judges upon Prizes 26, 27, 28, 29; and similarly that of Colonel Reid, C. B., to those of the judges in Class I, and Prizes 26, 27, 28, 29.

In consequence of the indisposition of J. Young, Esq., J. Goolden, Esq. is requested to act on the Audit of Accounts for 1858, and Saturday next is appointed for this purpose.

The receipt of 10 Copies of Drury's "Useful Plants" from Government is notified. Also from the Society the 2nd part, Vol. 10, of the Journal of the "Agricultural and Horticultural Society of India;" and the papers relative to the Imphee and Sorgho seeds are read—(to be recorded). For the foregoing the Committee express their thanks.

Some of this Imphee seed has been sown in the Gardens where it can be seen growing.

The following Gentlemen are declared to have been unanimously elected Members of the Society.

Louis Forbes, Esq. C. S., Capt. A. S. Moberly, Col. Hamilton, and H. A. Fletcher, Esq.

PHOTOGRAPHIC SOCIETY.

At a Meeting held on the 4th February at the School of Arts.

PRESENT.

The Hon'ble Mr. Elliot, Col. McCally, Lieut. Cole, Major Mitchell, Mr. A. Cole, Drs. Duff and Scott, Mr. Underwood in the Chair. Col. Hamilton was proposed and elected a Member.

A design for the dies of the Medals proposed to be awarded at the approaching Exhibition was submitted to the meeting and approved of with certain modifications. Mr. Elliot exhibited a Stereograph of the Caves of Adjunta, by Capt. Gill, also a Photogra-

phic print of the large temple in the Tanjore Fort, by Captain Tripe, which is chiefly remarkable in affording an accurate copy of the Tamul inscription on the casement, such a copy indeed as Photography alone could produce, and showing the very high value of that art, to those interested in antiquarian pursuits. Dr. Scott exhibited, through the kindness of Capt. Toynbee, of the Ship "Gloriana," a series of Stereoscopic Photographs taken by Professor Piazzi Smith, of Edinburgh, on the summit of Teneriffe. It was intimated by the Secretary that the prints for distribution for the year 1857-58, would shortly be received from England to members; especially those in the Mofussil are requested to be good enough to inform him by letters, to whom they would wish them delivered in Madras, and as many of those for the former year still remain unclaimed, it is proposed they would be sold, unless persons who may be entitled to those come forward to claim them within the next three months.

N. B.—Since the above was written, most of the prints have been received, they are sun prints toned with gold, and are much superior to those of last year which were obtained by Sutton's development process. The subjects are as follows :—

1st. Portrait of Lord Harris, by Nicholas, printed by Spencer.

2nd. Portrait of the late General Neill, photographed and printed by Moore, from an Oil Painting in the possession of Lady Neill.

3rd. A Mahomedan Tomb, by Capt. A. N. Scott, Madras Artillery, printed by Spencer.

4th. St. Mary's Church, Fort St. George, photographed by Lieut. Mitchell, printed by Spencer.

5th. A figure of Ganesha, the Monkey God, photographed by Spencer.

6th. Stone Car and Temple, by Dr. Neill, printed by Spencer.

Owing to the state of the atmosphere in England being unfavorable in the Winter season for printing, Mr. Spencer has been unable to complete the whole order, only 70 of Nos. 1 and 2 of No. 4 have been received. The remainder however will be received in course of a few months.

At a Meeting held on the 3rd March at the School of Arts.

PRESENT.

Col. McCally in the Chair.

Lieut. Cole.	Messrs. Underwood.
Mr. A. Cole.	,, Mitchell, and Scott.

The Secretary laid before the Meeting the prints for distribution for 1857-58, lately received from England which met with general approval. They are sun prints, toned with gold, and are very fair specimens of the best style of printing now in general use at Home. The attention of Members are again called to the fact of those prints being received, some are still to be received, but it is hoped they will reach this in the course of a few months. Meanwhile up-country members are requested to make known to the honorary Secretary the names of the parties to whom they would wish them to be delivered in Madras.

The subjects are as follows. Stone Car and Temple by Dr. Neill; a figure of Ganesha, by Dr. Neill; Mahomedan Tomb, by Captain Scott; St. Mary's Church, Fort St. George by Lieut. Mitchell; Portrait of Lord Harris, by Mr. Nicholas, and Portrait of late General Neill, by Mr. Moore of London.

In addition to the above Dr. Scott exhibited 10 Photographs which had been selected for the Society as samples of the present state of the art in Europe.

Amongst them are three Views, by Fenton (14 by 17) of Welch scenery, Rock, Wood, and Mountain (and water in instance) combined. Of these it is sufficient to say they will support the reputation of this distinguished Artist. There is also a view of part of Lichfield Cathedral, by the same Photographer, and which is an excellent specimen of Architectural Photography.

By Bissin Freres there is a large and a small view of the Mer-de-glace, with the highest pinnacle capped in clouds, also a beautiful little view of the "Chateau Chillon" a lovely bit of water clouds and distant hills.

Portuil de L'Eglise St. Germain L'Auferrais (which an inscrip-

tion on a street lamp tells us is in the " Place de Liberte") forms the subject of a magnificent print (16 by 20) by Gustave le Gray.

A Print (7 by 11) of a Statue, from the Photographic Institution Bond St. is a fair specimen of this application of the art. A slight want of definition in the eyes detracts somewhat from the merit of what would otherwise be called a fine picture.

But the gem of this small collection is a copy of Ary Scheffer's painting " Faust and Marguerite," nothing superior to this has reached Madras. The Photographer is Bingham, and the Publishers Goupil and Co., Paris, and London.

Lieut. J. Mitchell exhibited eight Prints from Collodion Negatives taken with the compound Microscope. The subjects were

The Proboscis of a Blow-fly,	Magnified	22	diameters.
A portion of the above	,,	40	,,
Trophi of a Wasp	,,	22	,,
Ditto of a smaller Wasp	,,	40	,,
Tarsus of a Grasshopper	,,	22	,,
Parasite of Fowl (an Acarus)	,,	50	,,

A Butterfly's Scale, from a small species of Polyammatus, and a group of differently shaped scales from the same wing. These were taken with Powell and Lealand's 1-12$^{B.}$ and are magnified about 550 diameters, or in Opticians' language above 300,000 times.

The above are promising examples of a branch of Photography, but little (if at all) attended to in this country.

Lieut. Mitchell said his only difficulty was the want of a surface on which to focus. Ground glass will not do at all, the abraded surface (acting as an infinity of Prisms) decomposes the light. The iodized Collodion plate recommended by Mr. Shadbolt is very little better; he thinks it possible that Rumey's Light Moderator may prevent the decomposition of the solar rays upon the focussing screen, but he has not yet traced it.

Lieut. Mitchell's mode of operating, he believes, is different from that usually followed in England; inasmuch as he uses the whole microscope and not the object glass only. This he says is advantageous in more ways than one.

First, there is a larger field and greater magnifying power.

Secondly, the over correction of the object glass being balanced by the eye-piece, the visual and active face are coincident; a matter of the first importance, and

Thirdly, by a very simple and inexpensive arrangement any Portrait Camera may be adopted to the purpose, without unfitting it for other work.

Lieut. Cole. brought to the notice of the Meeting a new publication entitled the Stereoscopic Magazine, of which five numbers have been already published. Each number contains three Stereoscopic pictures with explanatory letter press for each. A book on Stereoscope at the moderate price of 3*s.* 6*d.* is required to view these; the publication itself is cheap, the price of each number being only 2*s.* 6*d.*; on the whole it seems to be a promising work.

The prints sent by Dr. Neill were laid before the Meeting. A proposition for framing these beautiful Photographs was discussed, and it was resolved to frame these and have an estimate made of what it would cost to frame the Society's collection.

Read letter from Mr. Butcher offering to do printing work for Society.

Resolved, to reply that arrangements have been already made with Dr. Neill to have the printing done in England.

Read letter from Captain Tripe, offering one of his views as a Negative to be printed for distribution.

Resolved, to ask Capt. Tripe, to make his own selection for the purpose.

Read letter from Capt. A. N. Scott offering certain Negatives.

Resolved, that he be asked to send proofs.

Read letter from Dr. Pritchard offering to send some prints.

Resolved, that a letter of thanks be addressed to him with a request to him to send them.

DAILY MEANS.

October 1858.

Date.	Barometer reduced to 32° Faht.	Thermometers. Means. Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·822	84·9	78·5	92·6	80·4	S E	....	Hazy
2				93.1	78·8	S E	...	
3	·858	84·4	77·3	95·1	78·3	E S E	....	Clear.
4	·850	84·1	77·8	93·4	78·9	E S E	...	Hazy
5	·821	81·9	77·2	86·1	79·3	N E	0·121	Clody
6	·746	77·4	75·6	79·6	75·9	N N E	4·197	Ovest.
7	·662	79·7	77·1	86·2	79·8	N W	1·031	do
8	·792	81·7	77·6	90·2	78·6	S S E	....	Hazy
9				87·6	76·8	S E	0·214	
10	·757	77·4	75·5	80·7	74·3	N N E	2·576	Ovest.
11	·723	78·9	74·6	91·3	75·3	S S W	....	do
12	·805	81·6	77·8	90·9	77·4	S	....	Hazy
13	·846	80·2	77·1	84·9	79·0	?	1·448	Ovest.
14	·838	78·6	76·3	85·8	76·2	N	0·234	do
15	·812	79·4	76·7	87·1	76·2	N N E	·300	Clody.
16				86·9	78·3	N N E	....	
17	·833	80·3	77·4	86·5	78·3	N W	·111	do
18	·873	80·0	76·9	89·6	76·3	N N W	·030	do
19	·865	80·4	76·7	89·2	76·8	N	·105	Ovest
20	·866	79·5	74·9	87·0	76·5	N N W	....	do
21	·875	74·7	71·4	75·4	70·6	N N W	1·054	do
22	·837	75·3	72·5	81·9	73·4	N N W	0·471	do
23				88·0	75·2	N	....	
24	·820	78·2	74·8	87·2	75·8	S S W	·029	do
25	·842	78·7	75·3	86·3	77·5	N E	....	do
26	·918	78·8	75·0	87·8	74·7	N N W	....	Hazy
27	·930	78·1	72·5	87·4	73·7	?	....	do
28	·935	78·8	74·3	86·9	74·5	N N E	....	Clear.
29	·977	79·3	74·9	87·2	75·1	N N E	....	do
30				90·0	76·3	N N E	....	
31	·987	80·5	76·3	90·3	77·3	E N E	·150	Hazy
Means	29·842	79·7	75·9	87·5	76·6		12·071 Sum	

November 1858.

Date.	Barometer reduced to 30° Faht.	Thermometers. Means. Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·983	80·6	76·0	89·2	76·3	E S E	0·018	Clody.
2	·973	79·4	74·9	86·0	76·1	E N E	....	Hazy
3	·967	78·8	73·6	85·9	74·3	N N E	....	do
4	·980	78·7	74·5	84·2	77·1	N	·588	Ovest.
5	30·008	80·1	76·6	88·4	77·4	N	·460	Clody.
6				88·9	76·1	E N E	....	
7	29·983	79·6	75·9	86·8	75·3	E	1·440	Hazy
8	·962	79·1	73·8	84·8	74·8	E	....	do
9	·967	77·9	71·0	84·0	71·6	N E	....	Clear.
10	·975	78·3	73·3	85·9	75·4	N E	0·838	Ovest.
11	·960	78·7	73·5	84·6	76·2	N	·190	Clody.
12	·952	76·7	71·2	83·7	71·7	N N W	....	Hazy
13				82·8	76·8	N	2·235	
14	·962	76·5	73·9	80·0	75·4	N N E	5·585	Ovest.
15	30·019	74·1	72·6	79·3	73·2	N	2·540	do
16	·001	75·6	72·8	82·7	72·5	W N W	1·233	do
17	29·986	77·4	74·1	83·7	76·1	N	0·783	do
18	·958	78·7	75·0	84·0	77·1	N	·096	do
19	·915	77·5	73·8	79·8	75·1	N N E	2·262	do
20				79·4	72·7	N E	1·032	
21	·924	76·9	74·1	84·1	75·9	E N E	0·530	do
22	·904	78·3	75·7	84·8	76·6	E	·030	Clody.
23	·894	78·4	75·9	85·9	75·7	E	·150	do
24	·909	79·5	76·1	87·7	77·4	E N E	·038	Ovest.
25	·983	78·6	75·7	85·8	77·7	N E	·104	do
26	30·009	76·5	74·0	82·5	74·4	E N E	1·501	do
27				80·4	75·8	N N E	0·207	
28	·008	75·2	71·1	80·6	70·2	N N W	....	Clody.
29	29·997	75·2	71·9	82·0	73·0	N	·259	Ovest.
30	30·002	76·1	72·6	83·0	73·5	W N W	....	do
Means	29·968	77·8	74·0	84·0	75·0		22·119 Sum	

December 1858.

Date.	Barometer reduced to 32° Faht.	Thermometers. Means. Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·973	76·5	73·2	83·3	72·9	N N W	....	Clody.
2	·975	76·1	72·3	82·8	72·4	N	. ..	Hazy
3	30·009	75·0	71·0	81·9	70·3	N	....	do
4				81·4	69·2	N by E	....	
5	·014	73·1	67·1	80·1	67·3	N W	....	Clear.
6	·022	73·1	66·2	79·8	67·5	N	....	Hazy
7	29·992	74·5	69·3	80·4	70·5	N	....	Clody.
8	·955	76·9	71·3	83·2	75·1	N N E	...	Ovest.
9	·999	76·8	70·0	81·7	72·9	N	....	Clody.
10	30·019	74·7	68·1	82·2	69·1	N	....	Hazy
11				81·4	69·9	N N W	....	
12	29·975	73·7	68·3	79·9	69·6	N by W	....	do
13	·952	73·2	67·4	80·5	68·8	N by W	....	do
14	·989	74·3	68·2	80·9	71·7	N	....	Ovest.
15	·988	74·9	69·2	81·5	71·2	N	....	Clody.
16	30·002	74·5	68·8	80·8	71·4	N	..	Hazy
17	·016	73·7	69·1	83·0	69·2	N	....	Clear.
18				82·5	69·8	N by W	. ..	
19	·007	74·3	70·6	82·4	70·7	N	....	Hazy
20	·029	75·4	70·6	82·4	70·8	N by E	....	do
21	·053	74·3	70·6	82·4	70·1	N	...	Clody.
22	·039	75·5	69·8	82·9	69·9	N N E	....	do
23	·027	73·6	67·8	81·9	68·0	N E	....	Hazy
24	·028	74·1	67·8	80·6	68·8	N by W	....	do
25				81·1	72·6	N	....	
26	·022	74·9	69·1	81·2	69·7	N N E	....	do
27	·019	74·8	68·9	83·1	70·1	N	....	Clear.
28	·053	74·2	68·8	81·5	69·0	N	...	Hazy
29	·090	75·2	69·1	81·9	70·4	N	....	Clody.
30	·072	74·2	68·3	82·1	68·8	N	.. .	Hazy
31	·017	74·0	68·5	82·8	69·6	N by E	....	do
Means	30·013	74·6	69·2	81·7	70·2			

January 1859.

Date.	Barometer	Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1				82·1	68·7	N N E	....	
2	29·984	76·0	71·3	82·8	75·7	N by E	....	Hazy
3	·987	77·0	73·4	80·7	76·4	N	0·010	Ovest.
4	·952	76·8	74·0	84·5	75·6	N N W	....	Hazy
5	·965	77·2	73·1	83·0	73·4	N N W	·001	do
6	·972	75·8	72·7	80·8	71·4	N by W	·677	Clody.
7	30·005	76·4	72·3	82·2	74·1	N N W	...	Ovest
8				82·7	71·4	N N E	...	
9	·033	75·7	71·3	82·2	71·3	N by E	....	Hazy
10	·033	74·6	69·2	81·9	69·3	N N E	....	do
11	·034	73·9	68·9	81·3	68·0	N	....	do
12	·021	74·5	70·3	82·5	71·0	N	...	do
13	·009	74·7	69·9	81·3	69·6	N	....	do
14	·027	74·2	69·1	82·2	69·2	N N W	...	Clody.
15				82·1	73·5	N by E	....	
16	·046	76·7	69·7	83·3	75·8	N	...	Ovest.
17	·025	76·1	69·0	81·8	73·7	N by W	....	Hazy
18	29·983	75·1	68·8	81·5	69·8	N N W	....	do
19	·976	73·2	66·8	81·5	65·0	N by E	....	Clear.
20	30·014	75·8	67·9	81·8	71·6	N	....	do
21	·012	75·5	68·0	81·9	72·1	N N E	....	Hazy
22				81·5	67·1	N N E	...	
23	29·984	72·0	66·8	80·4	64·4	E N E	....	do
24	30·000	71·0	66·4	81·4	64·3	E	....	Clear.
25	29·960	70·6	66·6	80·8	62·8	?	...	do
26	·962	70·4	66·6	80·9	63·9	N by E	...	do
27	30·010	72·0	68·0	81·9	65·8	N N E	....	do
28	·025	72·9	68·4	81·8	67·7	N	....	do
29				82·3	66·0	N N E	....	
30	29·986	73·4	68·4	83·0	67·6	E N E	....	do
31	·990	72·7	67·9	82·3	65·9	N	....	do
Means	30.000	74·4	69·4	81·9	69·8		0·018 Sum.	

February 1859.

Date.	Barometer	Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	30·019	72·0	67·1	81·6	65·7	N E	....	Clear.
2	·024	74·0	68·8	84·2	69·4	N E	....	Hazy
3	·019	75·0	70·7	83·7	70·0	N N E	...	Clear.
4	·026	74·8	70·4	85·2	68·6	N E	....	do
5				84·5	67·2	E N E	....	
6	·045	74·4	69·9	83·7	68·8	N E	....	Hazy
7	·044	77·3	71·7	86·0	72·3	N E	....	Clody.
8	·008	78·6	73·9	87·8	75·1	N E	....	do
9	29·982	79·3	75·2	87·7	76·3	E by N	....	do
10	·974	78·0	74·0	87·8	73·0	E	....	do
11	30·013	79·6	74·6	87·1	77·6	E	....	do
12				85·7	74·6	E by N	....	
13	·012	78·2	73·2	86·7	72·3	N E	....	Hazy
14	29·992	77·6	73·2	86·1	72·3	N N E	....	Clear.
15	30·030	78·1	73·2	84·8	72·8	N N E	....	Hazy
16	·020	77·5	72·5	86·9	71·2	N N E	....	Clear.
17	29·978	77·3	72·7	85·6	71·6	?	....	do
18	30·006	76·5	71·4	84·7	70·9	E	....	Hazy
19				84·9	69·5	?	....	
20	·004	75·6	70·0	86·3	67·7	E	....	Clear.
21	29·955	74·7	68·9	85·6	67·2	?	....	do
22	·947	76·3	69·9	85·9	69·2	E S E	....	Hazy
23	·960	78·1	72·6	87·5	72·5	E S E	....	do
24	·973	79·9	74·2	87·5	74·1	E by N	....	do
25	·966	80·0	74·6	88·2	74·8	N E	....	do
26				88·7	73·4	E S E	....	
27	·944	79·2	73·6	87·9	72·1	E	....	Clear.
28	·928	78·2	72·4	88·6	71·6	E	....	do
Means	29·994	77·1	72·0	86·1	71·6			

March 1859.

Date.	Barometer	Dry	Wet	Max.	Min.	Wind.	Rain.	Remarks.
	Inches	°	°	°	°		Inches	
1	29·890	78·4	72·4	87·5	71·7	S E	....	Clear.
2	·840	78·1	72·4	88·2	71·2	E by S	...	do
3	.825	81·2	75·6	91·4	76·3	E S E	....	Hazy
4	·817	82·7	76·3	93·4	78·0	E S E	....	do
5				90·9	78·9	S E	....	
6	·851	82·5	77·2	92·0	77·7	S S E	....	Clear.
7	·888	81·9	76·5	92·0	76·9	S by E	....	do
8	·888	81·2	76·3	89·6	76·6	S S E	....	do
9	·873	80·9	75·5	89·9	75·2	S by E	..	Hazy
10	·873	80·7	75·9	91·0	75·3	S by E	.. .	do
11	·912	81·0	75·9	90·0	75·6	E S E	....	do
12				89·4	74·7	E S E	....	
13	·887	81·2	75·5	93·3	74·5	S E	....	Clody
14	·864	82·0	76·4	94·1	75·4	S	....	Hazy
15	·894	81·9	75·9	95·4	75·4	S S E	....	Clody.
16	·888	81·5	76·0	93·1	75·8	S E	....	do
17	·892	80·8	75·7	89·8	76·0	S S E	...	do
18	·968	79·9	75·2	89·6	74·4	S S E	....	do
19				89·9	73·5	E	...	
20	·949	79·1	73·9	89·5	73·1	?	....	Clear.
21	·992	79·6	73·7	90·9	73·3	E S E	....	Hazy
22	·982	79·4	74·1	90·2	73·0	E S E	....	Clear.
23	·989	81·2	75·8	91·2	76·3	E by N	....	Hazy
24	·974	83·8	78·2	94·0	78·8	E S E	....	Ovest.
25	·965	83·0	77·9	93·2	78·0	E S E	....	Clody.
26				93·7	78·4	S E	. ..	
27	·976	83·1	77·7	93·8	78·4	E by S	....	do
28	·957	83·1	77·3	93·1	76·7	S E	....	Hazy
29	·964	82·7	76·6	92·5	76·6	E S E	....	do
30	965	83·5	76·8	93·4	78·5	E by N	....	do
31	·961	84·0	76·6	91·5	81·4	E N E	....	do
Means	29·916	81·4	75·8	91·5	76·0			

? This mark signifies that no means can be taken owing to the variable state of the wind.

HOURLY MEANS.

Gottingen Mean Time.	Noon.	1	2	3	4	5	6	7	8	9	10	11
Madras Mean Time.	h. m. 4 41	h. m. 5 41	h. m. 6 41	h. m. 7 41	h. m. 8 41	h. m. 9 41	h. m. 10 41	h. m. 11 41	h. m. 12 41	h. m. 13 41	h. m. 14 41	h. m. 15 41
Bar. at 32° Far. 1858	In.	In.	In.	In.	In.	In.	In.	In.	In.	* In.	In.	* In.
Oct.	29·782	29 800	29·823	29 850	29·868	29 875	29 872	29 858	29 843	29·827	29·818	29·816
Nov.	·924	·940	·959	·986	30·000	30 008	30·001	·989	·967	·953	·943	·940
Dec.	·964	·976	·998	30·021	·037	047	·042	30·003	30·017	·999	·984	·981
Dry Ther. 1858	°	°	°	°	°	°	°	°	°	°	°	°
Oct.	82·1	80·5	79·8	79·4	78·9	78·4	78·1	77·7	77·3	77·1	76·9	76·6
Nov.	79·1	77·9	77·7	77·4	77·2	77·0	76·7	76·3	75·9	75·6	75·3	75·2
Dec.	77·3	76·1	75·4	75·0	74·6	74·0	73·4	72·8	71·9	71·4	70·9	70·6
Wet Ther. 1858												
Oct.	76·2	75·9	75·9	75·8	76·0	75·7	75·7	75·5	75·2	75·1	75·0	74·9
Nov.	74·2	73·7	73·6	73·5	73·5	73·5	73·4	73·5	73·5	73·2	73·0	73·0
Dec.	69·7	69·4	69·4	69·3	69·2	69·2	69·1	69·0	68·7	68·4	68·2	68·1
Bar. at 32° Far. 1859												
Jan.	29·956	29·967	29·985	30·009	30·026	30·034	30 027	30·018	30·001	29·987	29.970	29 967
Feb.	·942	·951	·966	29·991	·013	·026	·025	·016	·001	·987	975	·967
Mar.	·855	·867	·885	·910	29·931	29 945	29·943	27·932	29·916	·902	·894	·892
Dry Ther. 1859	°	°	°	°	°	°	°	°	°	°	°	°
Jan.	77·5	76·3	75·4	74·8	74·1	73·3	72·9	72·3	71·6	71·2	70·9	70·4
Feb.	81·3	79·4	78·1	77·2	76·4	75·7	75·0	74·4	73·6	72·9	72·2	71·7
Mar.	85·1	82·9	81·4	80·6	80·0	79·4	78·9	78·3	77·5	76·7	76·0	75·7
Wet Ther. 1859												
Jan.	70·4	70·0	69·7	69·5	69·2	68·8	68·7	68·5	68·4	68·1	67·9	67·7
Feb.	73·6	73·1	72·7	72·4	72·1	71·8	71·4	71·1	70·8	70·4	70·1	69·8
Mar.	77·2	76·7	76·3	76·0	75·8	75·5	75·3	75·0	74·6	74·3	74·1	73·8

Gottingen Mean Time.	12	13	14	15	16	17	18	19	20	21	22	23	Means
Madras Mean Time.	h. m. 16 41	h. m. 17 41	h. m. 18 41	h. m. 19 41	h. m. 20 41	h. m. 21 41	h. m. 22 41	h. m. 23 41	h. m. 0 41	h. m. 1 41	h. m. 2 41	h. m. 3 41	
Bar. at 32° Far. 1858	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Oct.	29·823	29·845	29·864	29 883	29·899	29·903	29·886	29 859	29 831	29 807	29·789	29·783	29 842
Nov.	·948	·966	·985	30 006	30·021	30·021	30·006	·979	·949	·925	·911	·915	·968
Dec.	·990	30·005	30·024	·052	·072	·073	·062	30·037	30·005	·976	·955	·953	30·013
Dry Ther. 1858	°	°	°	°	°	°	°	°	°	°	°	°	°
Oct.	76·2	76·0	76·7	78·9	79·5	82·2	83·0	83·3	83·8	83·7	83·3	82·8	79·7
Nov.	74·9	74·8	75·2	76·9	78·8	80·1	80·6	81·0	81·2	81·4	80·5	79·9	77·8
Dec.	70·2	69·7	69·9	72·5	75·5	77·6	78·4	78·9	79·3	79·1	78·9	78·2	74·6
Wet Ther. 1858													
Oct.	74·7	74·4	74·8	75·7	76·3	76·7	76·7	77·0	77·2	77·1	76·7	76·5	75·9
Nov.	72·9	72·8	73·0	73·7	74·4	75·2	75·4	75·4	75·6	75·6	75·2	74·6	74·0
Dec.	67·9	67·7	67·7	68·7	69·5	70·2	70·3	70·3	70·8	70·5	70·2	69·8	69·2
Bar. at 32° Far. 1859													
Jan.	29·974	29 991	30·008	30·034	30·055	30 057	30·048	30·026	29 995	29·965	29·947	29·946	30·000
Feb.	·972	·990	·006	·029	·050	·058	·048	·023	·994	·965	·940	·932	29 994
Mar.	·902	·919	29·937	29·962	29·980	29 985	29·974	29·949	·918	·886	·861	·851	·916
Dry Ther. 1859	°	°	°	°	°	°	°	°	°	°	°	°	°
Jan.	69·8	69·4	69·4	71·8	74·0	77·0	78·4	78·9	79·4	79·3	78·9	78·4	74·4
Feb.	71·3	70·9	70·8	74·1	77·7	80·2	81·9	82·9	83·5	83.7	83·3	82·7	77·1
Mar.	75·2	74·9	75·5	79·5	83·3	86·0	87·8	88·5	88·6	88·2	87·5	86·7	81·4
Wet Ther. 1859													
Jan.	67·5	67·3	67·2	68·4	69.9	70·8	71·3	71·6	71·7	71·6	71·1	70·7	69.4
Feb.	69·6	69·2	69·2	71·0	72·6	73·4	73·7	74·2	74·3	74·5	74 2	74·1	72.0
Mar.	73·5	73·1	73·4	75·1	76·4	76·9	77·4	77·6	78·1	78·0	77·8	77·7	75·8

* The numbers in these columns are not observed but interpolated for the sake of obtaining the daily means.

MADRAS OBSERVATORY:
August 1859.

W. K. WORSTER, Major.
Acting Astronomer.

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BRITISH
NATURAL HISTORY

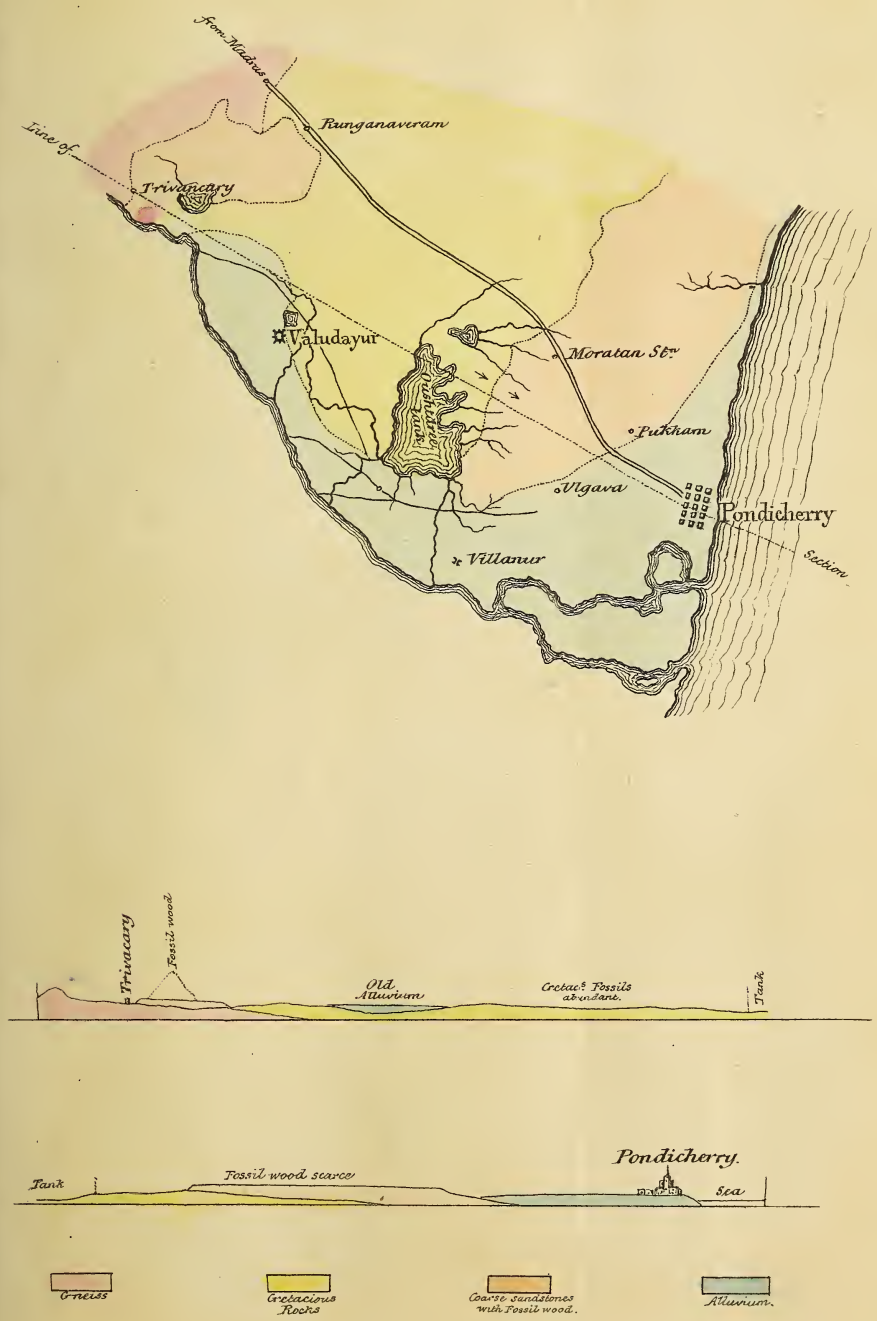
Chálukya Dynasty.

ON STONE BY J. SUARES

BRITISH MUSEUM
NATURAL HISTORY

Boar Type
1
5
7 Full Size
11.
10
SEALS,
WEIGHTS
AND
MEASURES

BRITISH MUSEUM
NATURAL HISTORY



Transfer by G. Winchester. Signed / Henry F. Blanford. Lith: by J. Dumphy, Govt. Press, Fort St. George

NATURAL HISTORY

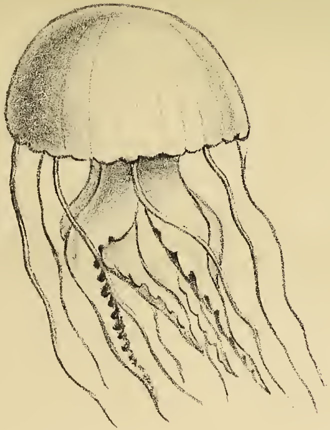


FIG: 1. PELAGIA NOCTILUCA

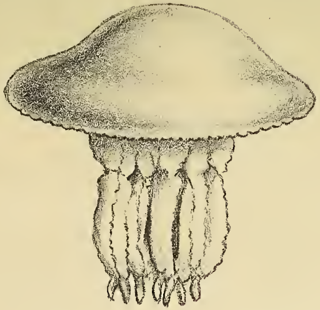


FIG: 2. RHIZOSTOMA.

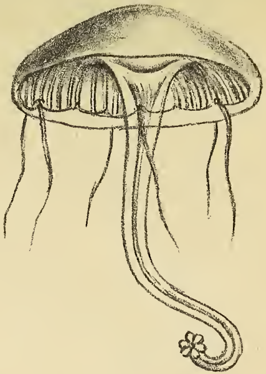


FIG: 3. GERYONIA

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BRITISH M
NATURAL HISTORY

Fig. 4 PHYSALIA

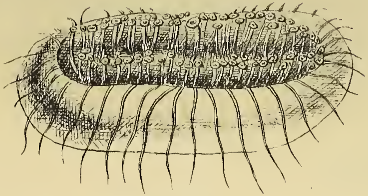

Fig. 5 VELELLA
Upside down.

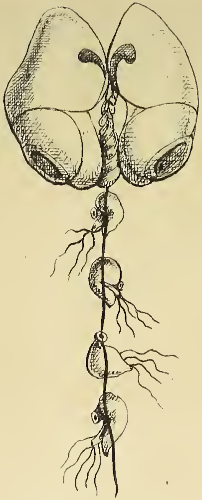

Fig. 6. DIPHYES BRAJAE

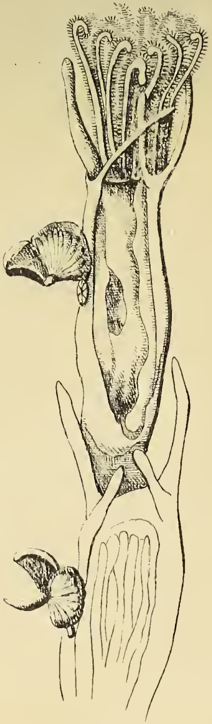

Fig. 7. CELLULARIA AVICULARIA

Fig. 8 BEROE.

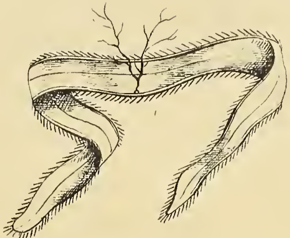

Fig. 9. CESTUM VENERIS

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NATURAL HISTORY

FIG: 10. SALPA MAXIMA.

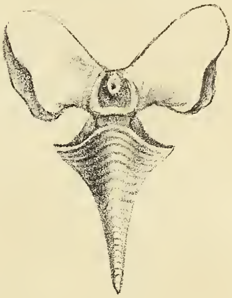

FIG: 11. HYALEA.

FIG: 12. SAGITTA.

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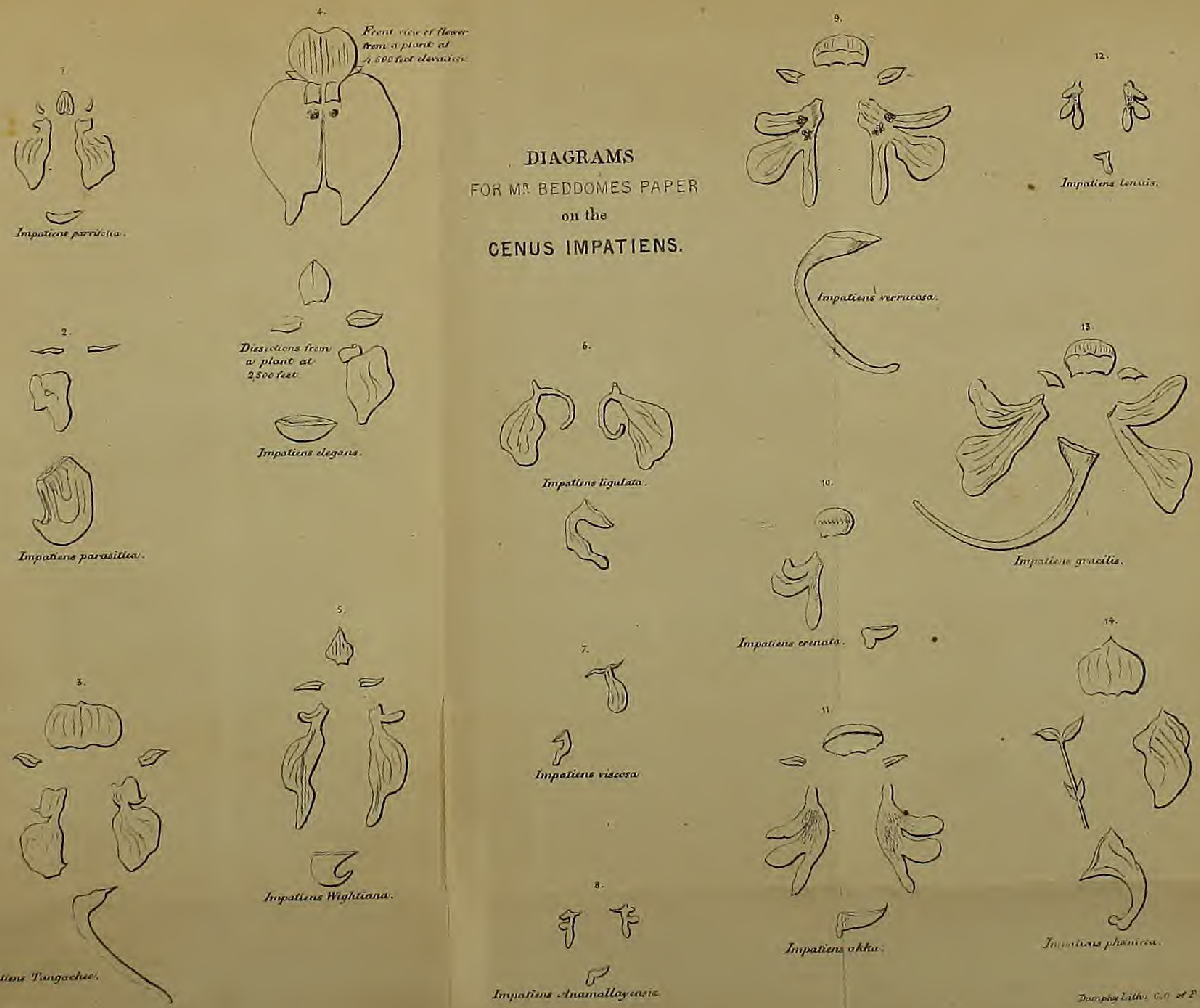
TISH MUSEU
AL HIST

DIAGRAMS
FOR Mr. BEDDOMES PAPER
on the
CENUS IMPATIENS.



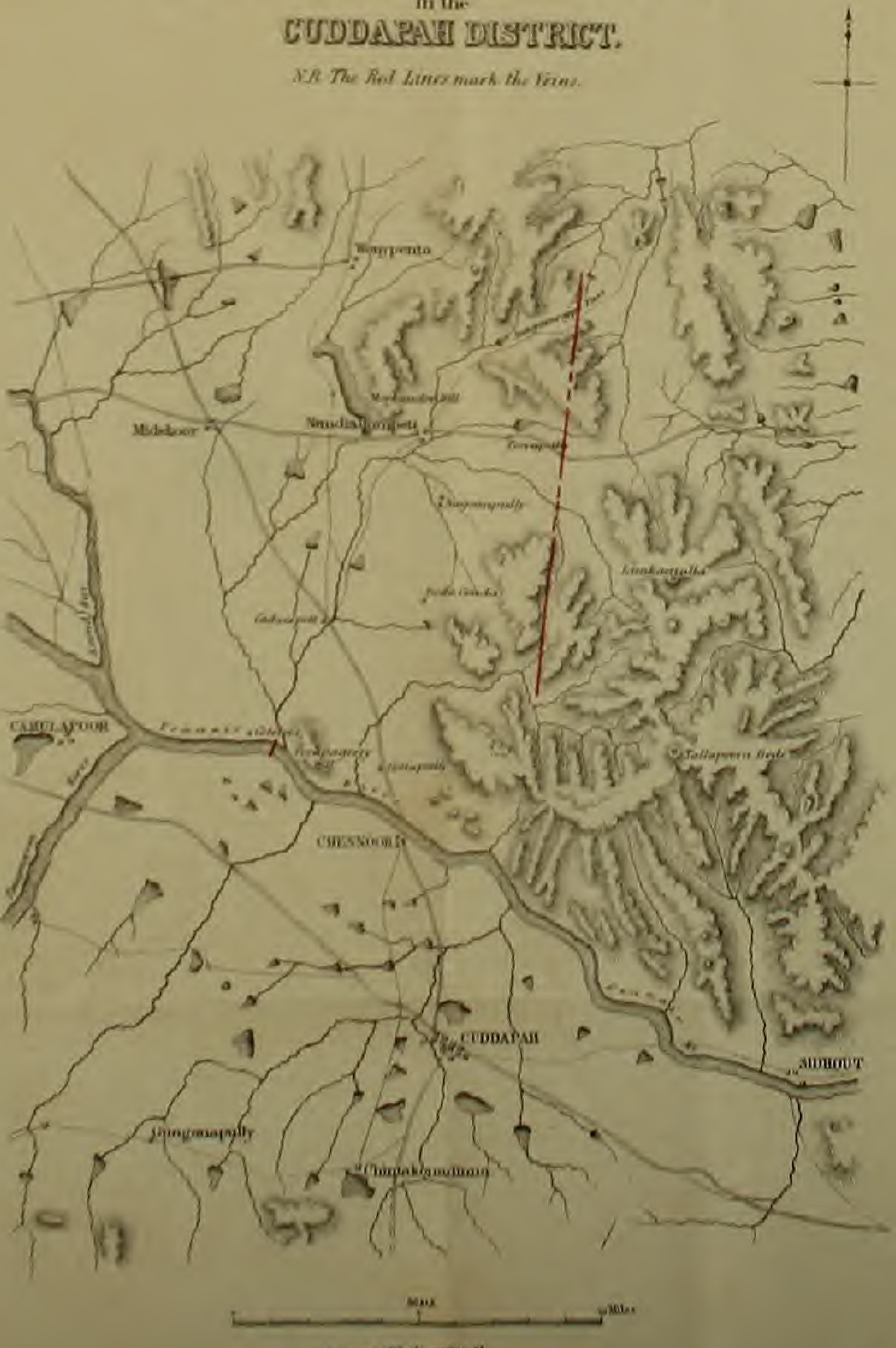
Drawn by H. R. Gahier

October 1859.

Dumphy Lith. C.O. of P. W.

MAP SHOWING THE POSITION OF MINERAL VEINS
in the
CUDDAPAH DISTRICT.

N.B. The Red Lines mark the Veins.



(Signed) Philip W. Wall
Mineral Viewer